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Section 7 Mechanical Parts List

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Section 11 Circuit Diagrams and Parts Locations

1-1 Introduction

This manual contains service information pertaining to the CARDIOLIFE model TEC-7000 series defibrillator. Information concerning optional units such as transmitters, receivers, interface units, and pacing units is not included. See pages 1.10 to 1.12 for the models of TEC-7000 series. The operation and performance of all these models are the same unless otherwise specified. Also refer to the operator's manual to become familiarized with the equipment.

The CARDIOLIFE TEC-7000 series is a lightweight, compact system with an integrated recorder, dual-trace 5.5-inch CRT, AC power unit and battery charger. The TEC-7000 series is designed for simple operation during a cardiac emergency with only two steps required before energy discharge and a one-step energy level adjustment.

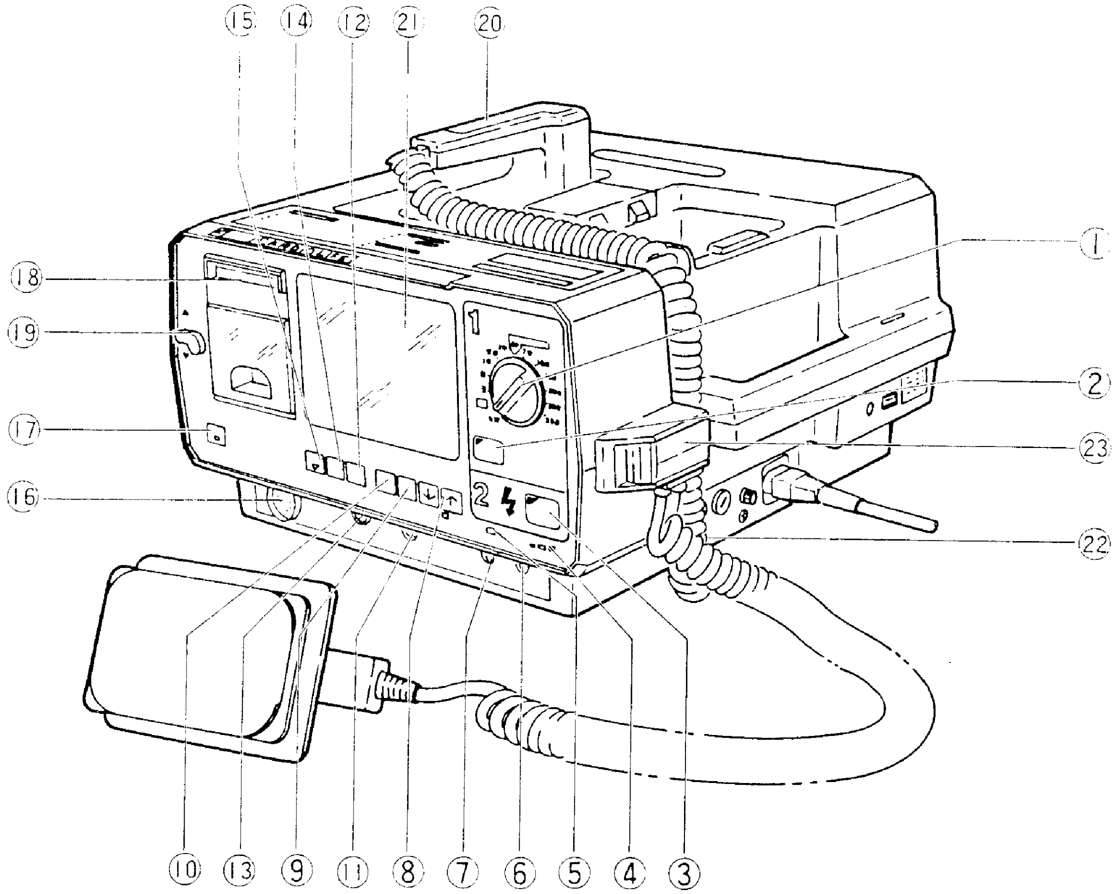
Special care must be taken for the power unit and high voltage board/block as these units have a dangerously high voltage level.

Difference among TEC-7000 series

Function	TEC-7100	TEC-7200	TEC-7300
Internal paddle	No	Yes	Yes
Paddle contact indicator	No	Yes	Yes
Delivered energy printing	No	Yes	Yes
Transthoracic resistance printing	No	Yes	Yes
Interface unit connection	No	No	Yes
Pacing unit connection	No	No	Yes
Slow paper speed (5mm/s)	No	No	Yes
VPC detection	No	No	Yes
Trendgraph	No	No	Yes

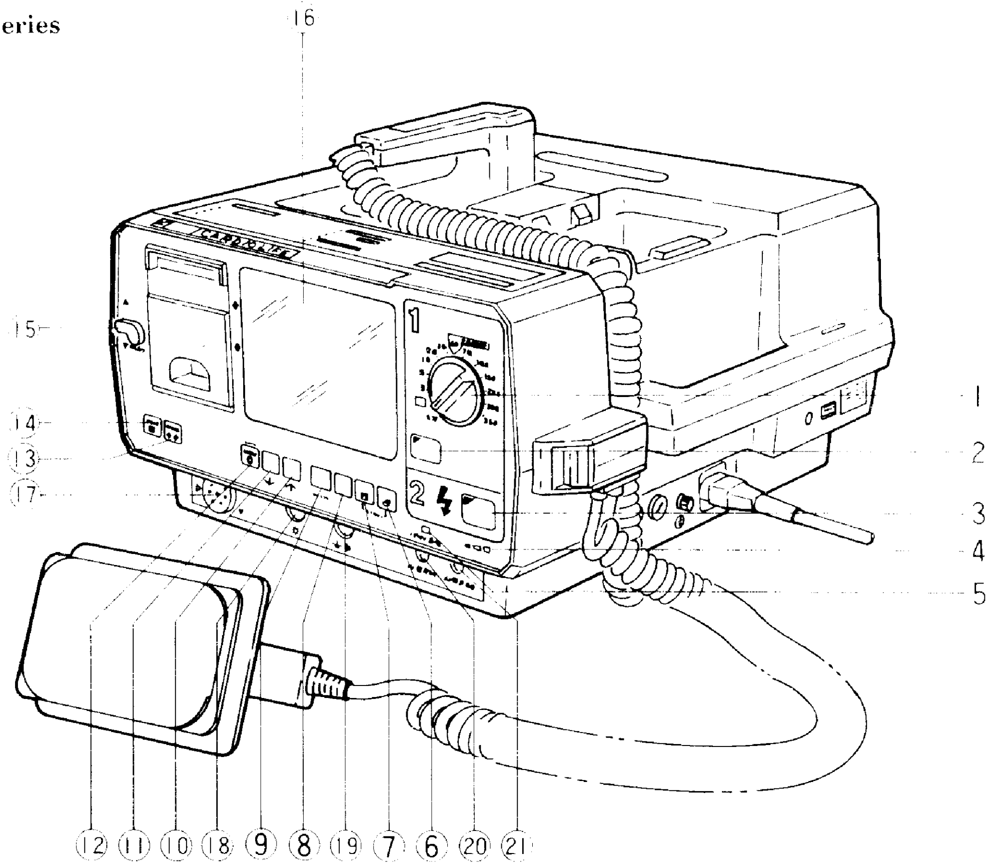
1-2 Name of Panels, Controls, etc

TEC-7100/7200 series



1	Output energy select dial
2	Synchronization mode select key
3	Energy charge key
4	Battery level indicator
5	Battery charge indicator
6	ECG output terminal
7	External ECG input terminal
8	High / low select key / calibration key
9	High / low limit set
10	Alarm ON / OFF key
11	QRS sound volume control knob
12	Sensitivity select key
13	Intensity control knob
14	Lead select key
15	Freeze key
16	ECG input connector
17	Record / stop key
18	Recorder
19	Head release / paper feed lever
20	Paddle
21	Monitor
22	AC power switch
23	Paddle connector (TEC -7200 only)

TEC-7300 series



1 Output energy selection dial

2 Synchronization mode select key

3 Energy charge key

4 Battery level indicator

5 Battery charge indicator

6 Display mode select key

7 Calibration key

8 Alarm on/off select key

9 Alarm set key

10 Sensitivity select key
Increase key

11 Lead select key
Decrease key
RECALL wave select key

12 Freeze key

13 Record select key

14 Record/stop key

15 Head release/paper feed lever

16 Monitor

17 ECG input connector

18 Intensity control knob

19 QRS sound volume control knob

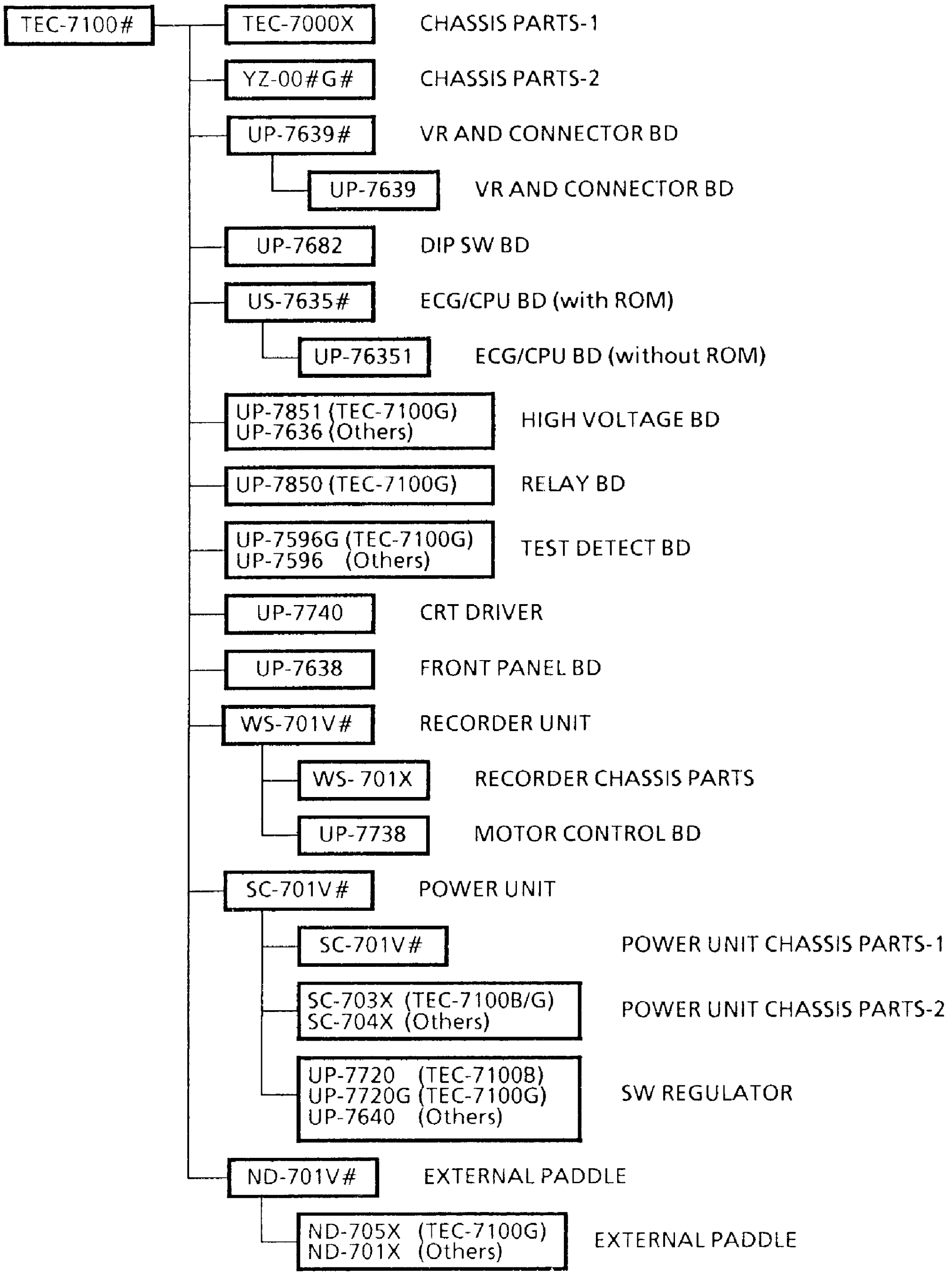
20 External input terminal

21 External output terminal

1-3 Composition

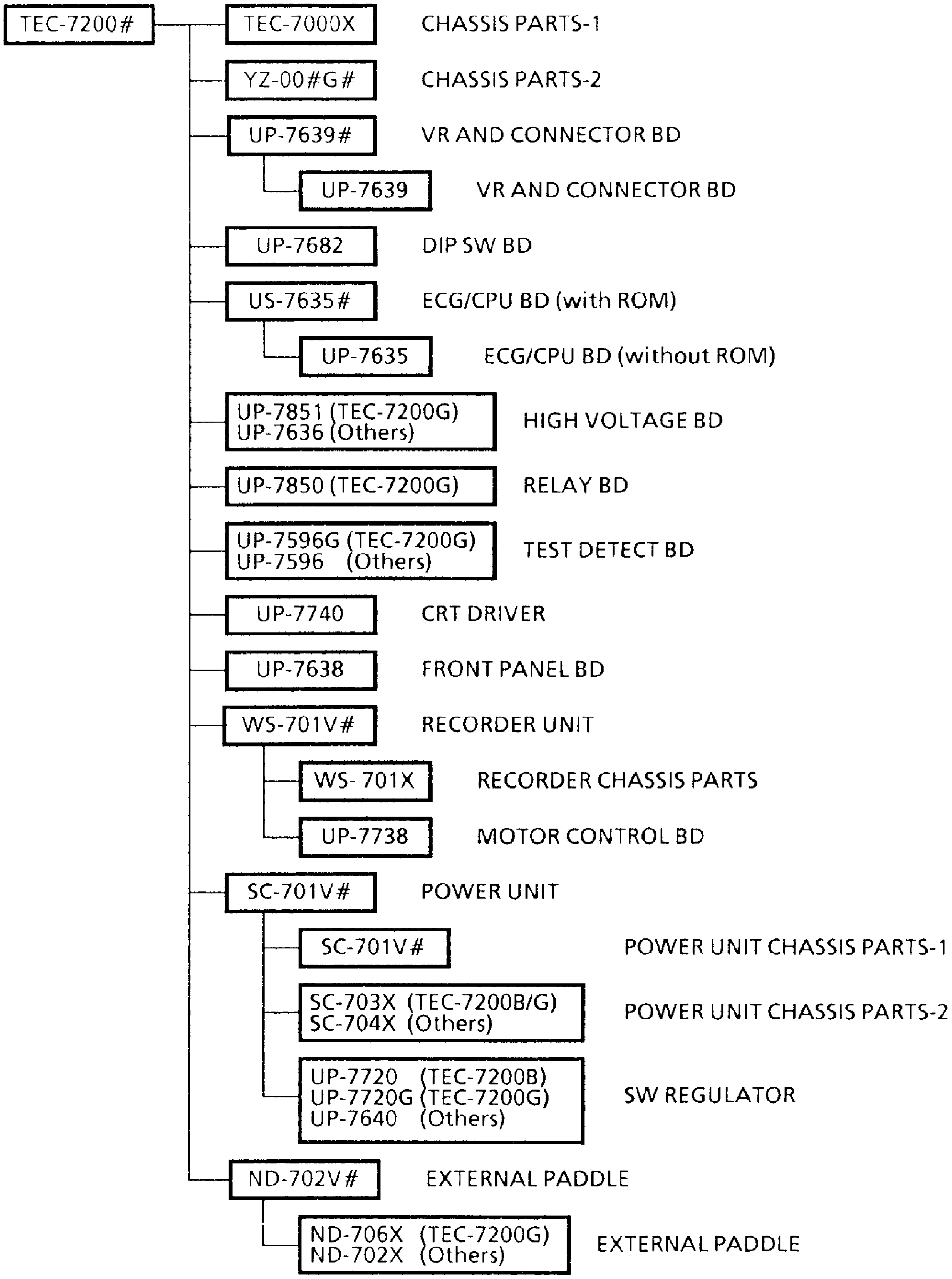
1-3-1 Main Unit

TEC-7100 series


TEC-7100#
TEC-7000X
CHASSIS PARTS-1
YZ-00#G#
CHASSIS PARTS-2
UP-7639#
VR AND CONNECTOR BD
UP-7639
VR AND CONNECTOR BD
UP-7682
DIP SW BD
US-7635#
ECG/CPU BD (with ROM)
UP-76351
ECG/CPU BD (without ROM)
UP-7851 (TEC-7100G)
UP-7636 (Others)
HIGH VOLTAGE BD
UP-7850 (TEC-7100G)
RELAY BD
UP-7596G (TEC-7100G)
UP-7596 (Others)
TEST DETECT BD
UP-7740
CRT DRIVER
UP-7638
FRONT PANEL BD
WS-701V#
RECORDER UNIT
WS- 701X
RECORDER CHASSIS PARTS
UP-7738
MOTOR CONTROL BD
SC-701V#
POWER UNIT
SC-701V#
POWER UNIT CHASSIS PARTS-1
SC-703X (TEC-7100B/G)
SC-704X (Others)
POWER UNIT CHASSIS PARTS-2
UP-7720 (TEC-7100B)
UP-7720G (TEC-7100G)
UP-7640 (Others)
SW REGULATOR
ND-701V#
EXTERNAL PADDLE
ND-705X (TEC-7100G)
ND-701X (Others)
EXTERNAL PADDLE

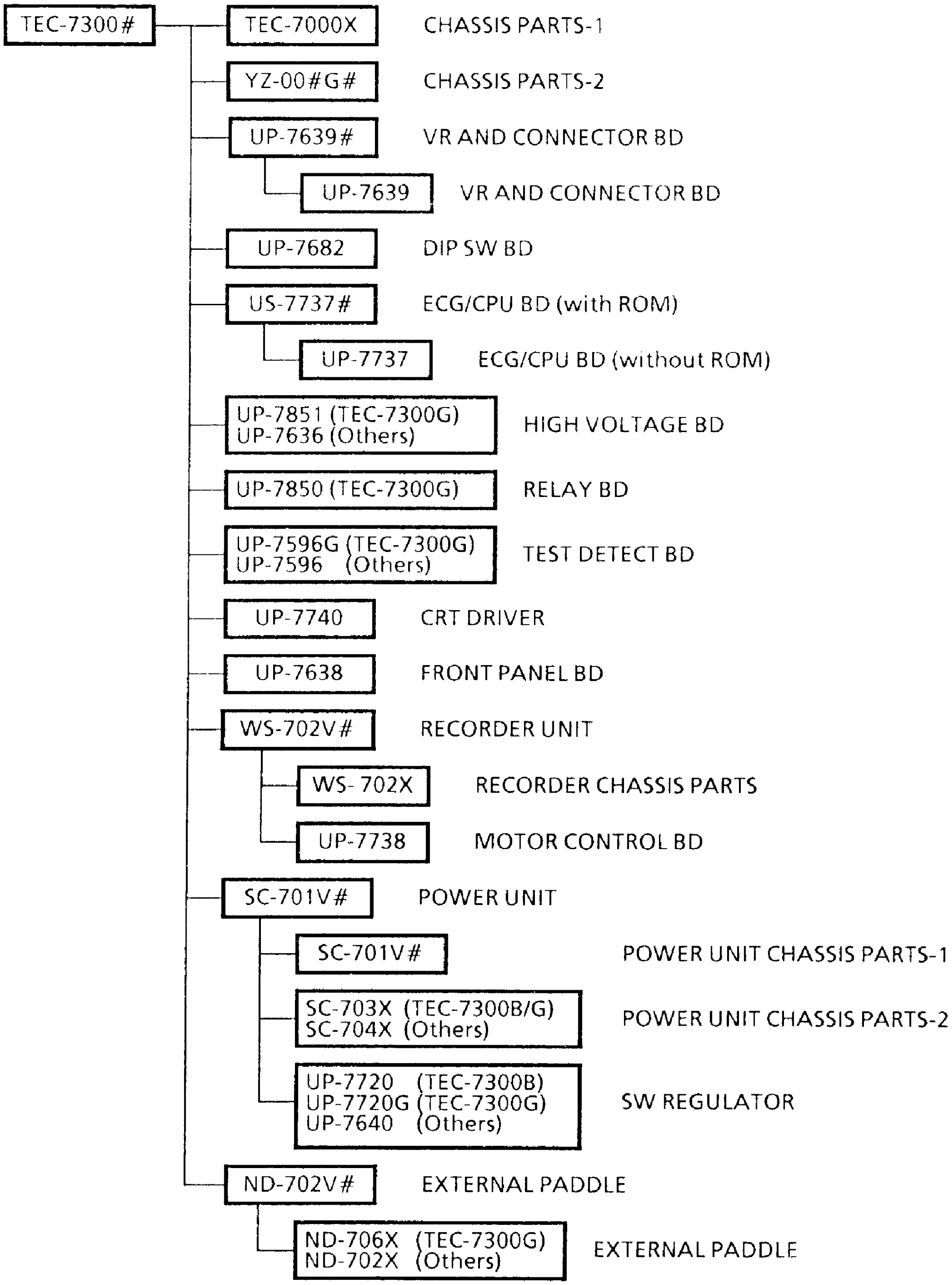
Units with # mark differ according to the model.
See page 1.10 for units with # mark.

TEC-7200 series


TEC-7200#
TEC-7000X
CHASSIS PARTS-1
YZ-00#G#
CHASSIS PARTS-2
UP-7639#
VR AND CONNECTOR BD
UP-7639
VR AND CONNECTOR BD
UP-7682
DIP SW BD
US-7635#
ECG/CPU BD (with ROM)
UP-7635
ECG/CPU BD (without ROM)
UP-7851 (TEC-7200G)
UP-7636 (Others)
HIGH VOLTAGE BD
UP-7850 (TEC-7200G)
RELAY BD
UP-7596G (TEC-7200G)
UP-7596 (Others)
TEST DETECT BD
UP-7740
CRT DRIVER
UP-7638
FRONT PANEL BD
WS-701V#
RECORDER UNIT
WS- 701X
RECORDER CHASSIS PARTS
UP-7738
MOTOR CONTROL BD
SC-701V#
POWER UNIT
SC-701V#
POWER UNIT CHASSIS PARTS-1
SC-703X (TEC-7200B/G)
SC-704X (Others)
POWER UNIT CHASSIS PARTS-2
UP-7720 (TEC-7200B)
UP-7720G (TEC-7200G)
UP-7640 (Others)
SW REGULATOR
ND-702V#
EXTERNAL PADDLE
ND-706X (TEC-7200G)
ND-702X (Others)
EXTERNAL PADDLE

Units with # mark differ according to the model.
See page 1.11 for units with # mark.

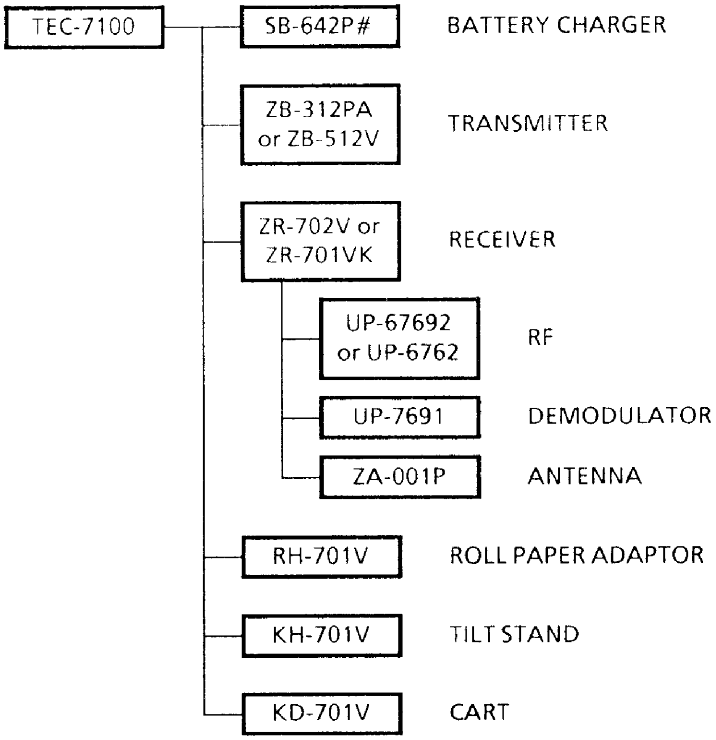
TEC-7300 series


TEC-7300#
TEC-7000X CHASSIS PARTS-1
YZ-00#G# CHASSIS PARTS-2
UP-7639# VR AND CONNECTOR BD
UP-7639 VR AND CONNECTOR BD
UP-7682 DIP SW BD
US-7737# ECG/CPU BD (with ROM)
UP-7737 ECG/CPU BD (without ROM)
UP-7851 (TEC-7300G)
UP-7636 (Others) HIGH VOLTAGE BD
UP-7850 (TEC-7300G) RELAY BD
UP-7596G (TEC-7300G)
UP-7596 (Others) TEST DETECT BD
UP-7740 CRT DRIVER
UP-7638 FRONT PANEL BD
WS-702V# RECORDER UNIT
WS- 702X RECORDER CHASSIS PARTS
UP-7738 MOTOR CONTROL BD
SC-701V# POWER UNIT
SC-701V# POWER UNIT CHASSIS PARTS-1
SC-703X (TEC-7300B/G)
SC-704X (Others) POWER UNIT CHASSIS PARTS-2
UP-7720 (TEC-7300B)
UP-7720G (TEC-7300G)
UP-7640 (Others) SW REGULATOR
ND-702V# EXTERNAL PADDLE
ND-706X (TEC-7300G)
ND-702X (Others) EXTERNAL PADDLE

Units with # mark differ according to the model.
See page 1.12 for units with # mark.

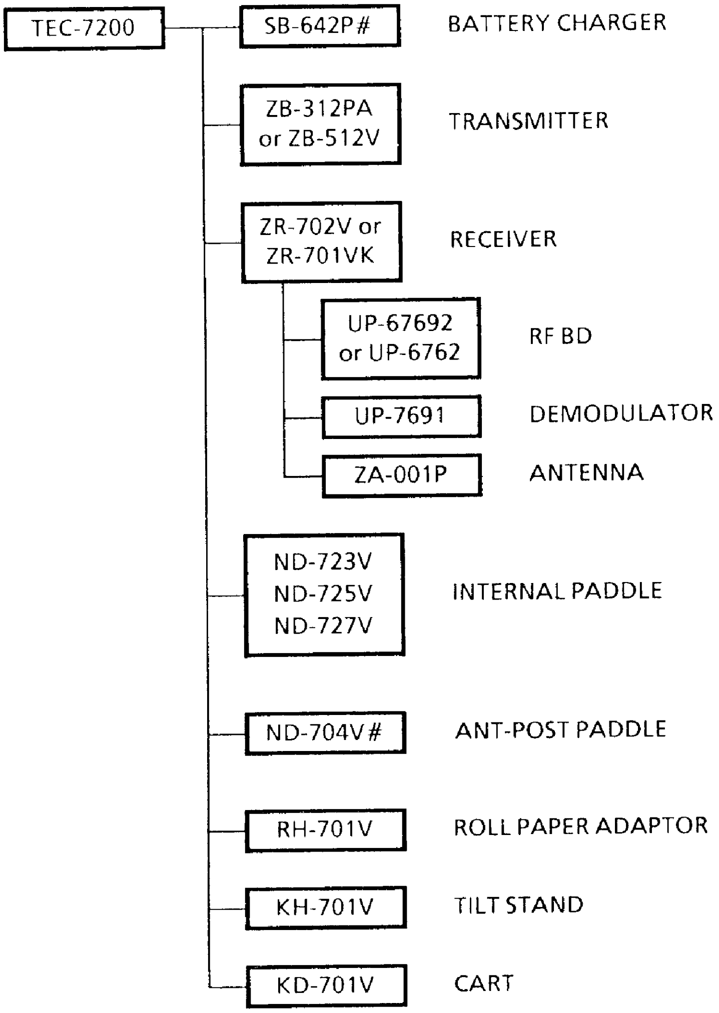
1-3-2 Optional Units

TEC-7100 series


TEC-7100
SB-642P#
BATTERY CHARGER
ZB-312PA or ZB-512V
TRANSMITTER
ZR-702V or ZR-701VK
RECEIVER
UP-67692 or UP-6762
RF
UP-7691
DEMODULATOR
ZA-001P
ANTENNA
RH-701V
ROLL PAPER ADAPTOR
KH-701V
TILT STAND
KD-701V
CART

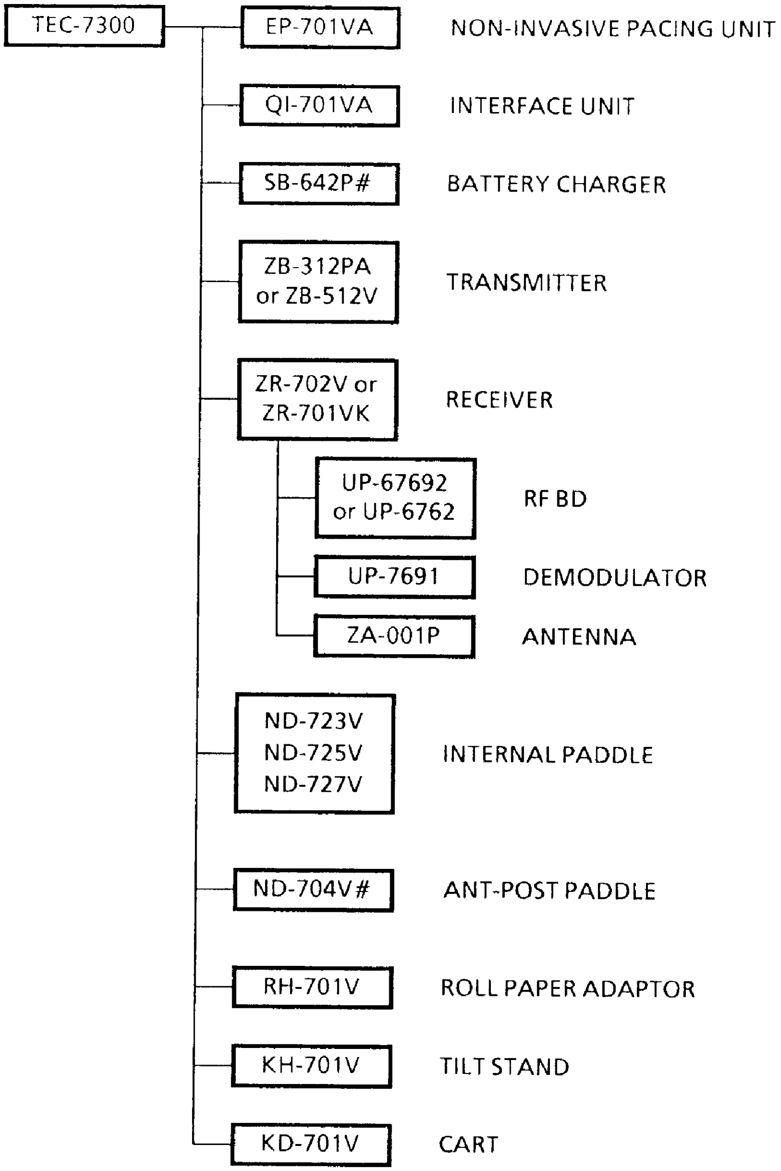
Units with # mark differ according to the model.
See page 1.10 for units with # mark.

TEC-7200 series


TEC-7200
SB-642P#
BATTERY CHARGER
ZB-312PA or ZB-512V
TRANSMITTER
ZR-702V or ZR-701VK
RECEIVER
UP-67692 or UP-6762
RF BD
UP-7691
DEMODULATOR
ZA-001P
ANTENNA
ND-723V
ND-725V
ND-727V
INTERNAL PADDLE
ND-704V#
ANT-POST PADDLE
RH-701V
ROLL PAPER ADAPTOR
KH-701V
TILT STAND
KD-701V
CART

Units with # mark differ according to the model.
See page 1.11 for units with # mark.

TEC-7300 series


TEC-7300
EP-701VA
NON-INVASIVE PACING UNIT
QI-701VA
INTERFACE UNIT
SB-642P#
BATTERY CHARGER
ZB-312PA or ZB-512V
TRANSMITTER
ZR-702V or ZR-701VK
RECEIVER
UP-67692 or UP-6762
RF BD
UP-7691
DEMODULATOR
ZA-001P
ANTENNA
ND-723V ND-725V ND-727V
INTERNAL PADDLE
ND-704V#
ANT-POST PADDLE
RH-701V
ROLL PAPER ADAPTOR
KH-701V
TILT STAND
KD-701V
CART

Units with # mark differ according to the model.
See page 1.12 for units with # mark.

1-3-3 System Component Table

TEC-7100 series

	TEC-7100A	TEC-7100B	TEC-7100C	TEC-7100E	TEC-7100F	TEC-7100G	TEC-7100H	TEC-7100J	TEC-7100K	TEC-7100R
AC Line Voltage	117V	240V	220V	220V	220V	220V	220V	100/110/117V	220/240V	220V
AC Line Frequency	60Hz	50Hz	50Hz	50Hz	50Hz	50Hz	50Hz	50/60Hz	50/60Hz	50Hz
Chassis parts	YZ-000G8	YZ-000G9	YZ-001G0	YZ-001G6	YZ-001G1	YZ-001G2	YZ-001G8	YZ-001G4	YZ-001G5	YZ-001G3
External paddle	ND-701V	ND-701V	ND-701V	ND-701VE	ND-701VF	ND-701VG	ND-701VH	ND-701V	ND-701V	ND-701VR
Power unit	SC-701VA	SC-701VB	SC-701VC	SC-701VE	SC-701VF	SC-701VG	SC-701VH	SC-701VJ	SC-701VK	SC-701VR
Recorder unit	WS-701VA	WS-701VA	WS-701VC	WS-701VE	WS-701VF	WS-701VG	WS-701VH	WS-701VA	WS-701VA	WS-701VR
VR and connector BD	UP-76391	UP-76392	UP-76392	UP-76397	UP-76395	UP-76393	UP-76398	UP-76392	UP-76392	UP-76396
ECG/CPU BD with ROM	US-76353	US-76355	US-76355	US-76359	US-7635A	US-76357	US-7635K	US-76355	US-76355	US-7635B
High voltage BD	UP-7636	UP-7636	UP-7636	UP-7636	UP-7636	UP-7851	UP-7636	UP-7636	UP-7636	UP-7636
Relay BD	-----	-----	-----	-----	-----	UP-7850	-----	-----	-----	-----
Test detect BD	UP-7596	UP-7596	UP-7596	UP-7596	UP-7596	UP-7596G	UP-7596	UP-7596	UP-7596	UP-7596
Transmitter	ZB-312PA	-----	ZB-512V	-----	-----	-----	-----	ZB-512V	ZB-512V	-----
Receiver	ZR-702V	-----	ZR-701VK	-----	-----	-----	-----	ZR-701VK	ZR-701VK	-----
Battery charger	SB-642PA	SB-642PK	SB-642PK	-----	-----	-----	-----	SB-642PK	SB-642PK	-----

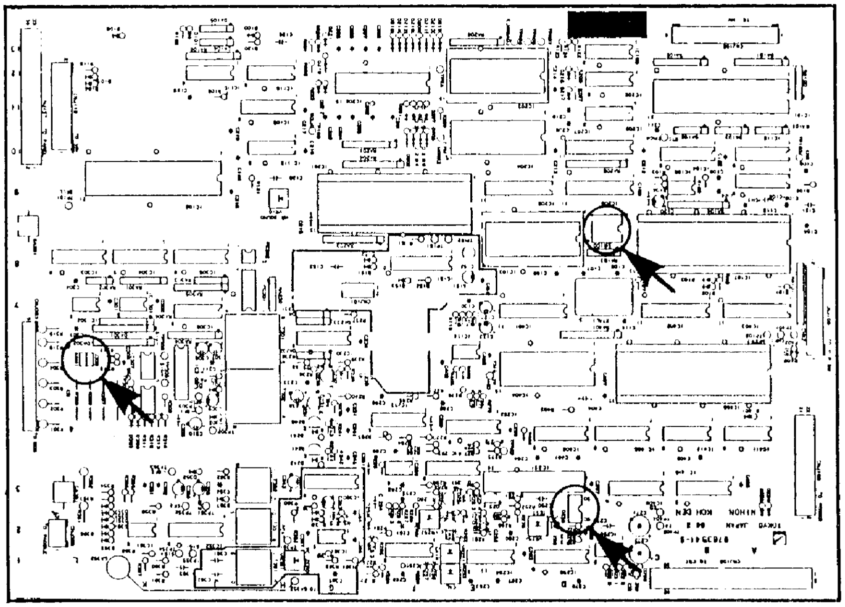
TEC-7200 Series

	TEC-7200A	TEC-7200B	TEC-7200C	TEC-7200E	TEC-7200F	TEC-7200G	TEC-7200H	TEC-7200J	TEC-7200K	TEC-7200R
AC Line Voltage	117V	240V	220V	220V	220V	220V	220V	100 / 110 / 117V	220 240V	220V
AC Line Frequency	60Hz	50Hz	50Hz	50Hz	50Hz	50Hz	50Hz	50 60Hz	50 60Hz	50Hz
Chassis parts	YZ-002G1	YZ-002G2	YZ-002G3	YZ-002G9	YZ-002G4	YZ-002G5	YZ-003G1	YZ-002G7	YZ-002G8	YZ-002G6
External paddle	ND-702V	ND-702V	ND-702V	ND-702VE	ND-702VF	ND-702VG	ND-702VH	ND-702V	ND-702V	ND-702VR
Internal paddle	ND-704V	ND-704V	ND-704V	ND-704VE	ND-704VF	ND-704VG	ND-704VH	ND-704V	ND-704V	ND-704VR
Power unit	SC-701VA	SC-701VB	SC-701VC	SC-701VE	SC-701VF	SC-701VG	SC-701VH	SC-701VJ	SC-701VK	SC-701VR
Recorder unit	WS-701VA	WS-701VA	WS-701VC	WS-701VE	WS-701VF	WS-701VG	WS-701VH	WS-701VA	WS-701VA	WS-701VR
VR and connector BD	UP-76391	UP-76392	UP-76392	UP-76397	UP-76395	UP-76393	UP-76398	UP-76392	UP-76392	UP-76396
ECG/CPU BD with ROM	US-76352	US-76354	US-76354	US-76358	US-7635F	US-76356	US-7635J	US-76354	US-76354	US-7635R
High voltage BD	UP-7636	UP-7636	UP-7636	UP-7636	UP-7636	UP-7851	UP-7636	UP-7636	UP-7636	UP-7636
Relay BD	-----	-----	-----	-----	-----	UP-7850	-----	-----	-----	-----
Test detect BD	UP-7596	UP-7596	UP-7596	UP-7596	UP-7596	UP-7596G	UP-7596	UP-7596	UP-7596	UP-7596
Transmitter	ZB-312PA	-----	ZB-512V	-----	-----	-----	-----	ZB-512V	ZB-512V	-----
Receiver	ZR-702V	-----	ZR-701VK	-----	-----	-----	-----	ZR-701VK	ZR-701VK	-----
Battery charger	SB-642PA	SB-642PK	SB-642PK	-----	-----	-----	-----	SB-642PK	SB-642PK	-----

TEC-7300 Series

	TEC-7300A	TEC-7300C	TEC-7300E	TEC-7300G	TEC-7300J	TEC-7300K
AC Line Voltage	117V	220V	220V	220V	100 / 110 / 117V	220 / 240V
AC Line Frequency	60Hz	50Hz	50Hz	50Hz	50 / 60Hz	50 / 60Hz
Chassis parts	YZ-003G4					
External paddle	ND-702V	ND-702V	ND-702VE	ND-702VG	ND-702V	ND-702V
Internal paddle	ND-704V	ND-704V	ND-704VE	ND-704VG	ND-704V	ND-704V
Power unit	SC-701VA	SC-701VC	SC-701VE	SC-701VG	SC-701VJ	SC-701VK
Recorder unit	WS-702VA	WS-702VC	WS-702VE	WS-702VG	WS-702VA	WS-702VA
VR and connector BD	UP-76391	UP-76392	UP-76397	UP-76393	UP-76392	UP-76392
ECG/CPU BD with ROM	US-7737	US-7737	US-77372	US-77371	US-7737	US-7737
High voltage BD	UP-7636	UP-7636	UP-7636	UP-7851	UP-7636	UP-7636
Relay BD	-----	-----	-----	UP-7850	-----	-----
Test detect BD	UP-7596	UP-7596	UP-7596	UP-7596G	UP-7596	UP-7596
Transmitter	ZB-312PA	ZB-512V	-----	-----	ZB-512V	ZB-512V
Receiver	ZR-702V	ZR-701VK	-----	-----	ZR-701VK	ZR-701VK
Battery charger	SB-642PA	SB-642PK	-----	-----	SB-642PK	SB-642PK

1-4 Internal Switch Setting (ECG/CPU Board)



SW100 Mode select switch (Not mounted on TEC-7300)

No.	ON	OFF
1, 2	Not used	Not used
3	Synchronization mode is not released when the energy is discharged (Initial setting for other than TEC-7100 / 7200A).	Synchronization mode is re-leased when the energy is dis-charged. For the next cardiover-sion, press the SYNC button again (Initial setting for TEC-7100 / 7200A).
4	TEC-7100	TEC-7200

SW102 AC filter frequency select switch

No.	ON	OFF
1, 2	60Hz	50Hz

J300 ECG connection cable select socket

AAMI	The other position
TEC-7100 / 7200/7300A	Other than TEC-7100 / 7200/7300A

Section 2 SPECIFICATIONS

CONTENTS

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Monitor Section 2.4
Recorder Section 2.5
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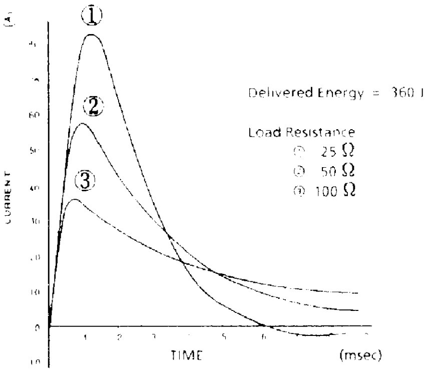
External Paddle 2.7
General 2.8

◆ DEFIBRILLATOR SECTION

Output Energy:	3, 5, 10, 20, 30, 50, 70, 100, 150, 200, 300, and 360J (at 50Ω load)
Energy Limit:	50 J max. for the internal paddles
Output Waveform:	Edmark



Charging Time:	≦ 10 sec (AC power supply) ≦ 12 sec (Fully charged new battery)
Synchronization Trigger:	I, II, III, aVR, aVL, aVF, V, test, and external ECG Paddle sychronization is available according to the DIP switch setting.
Discharge Test:	"TEST OK" is displayed on the CRT when energy of 50 J is normally discharged to the built-in test load. If energy of other than 50J is discharged to the test load, "NG (TEST AT 50J)" is displayed.
Charge Status Indication:	LED indicator on the main unit and paddle During charging: Blinks After charge is complete: Lit Energy value display on the CRT During charging: Blinks After charge is complete: Lit Continuous tone is emitted after charge is complete.
Discharge Timing:	≦ 30 msec after discharge buttons are pressed (async mode) ≦ 30 msec after a synchronized point (sync mode)

Automatic Internal Discharge:	Stored energy is internally discharged in the following cases: 40sec (±5sec) after charging starts. Power is turned off. Energy selector is set to ECG/MON. 300 msec after energy discharge when the power source is changed from AC to battery during energy charging. Paddles are disconnected from the main unit.
Automatic Synchronization Reset:	Sync mode is automatically turned off (async mode) when the energy is discharged (TEC-7100/7200/7300A).
Paddle Contact Impedance: (TEC-7200/7300)	Indicated by three colored LEDs on the sternum paddle. Green: 0 to 100Ω Yellow: 100 to 200Ω Red: ≧200Ω
Transthoracic Resistance: (TEC-7200/7300)	Printed when energy is discharged to the patient.
Delivered Energy: (TEC-7200/7300)	Printed when energy is discharged to the patient.

◆ ECG AMPLIFIER SECTION

Input:	5-electrode mode: Paddle, telemetry (when the receiver is connected), I, II, III, aVR, aVL, aVF, V, external input,and test 3-electrode mode: Paddle, telemetry (when the receiver is connected, TEC-7300), I, II, III, and test
Gain:	× 1/2, × 1, × 2, × 4 and ×AG (Auto Gain)
Frequency Response:	0.5 to 100 Hz (through ECG electrodes, MON mode) 0.05 to 100 Hz (through ECG electrodes, ECG mode) 0.5 to 30 Hz (through paddles)
CMRR:	≧ 95 dB
Input Impedance:	≧ 5 MΩ at 10 Hz, through ECG electrodes ≧ 100 KΩ at 10 Hz, through paddles
Patient Leakage Current:	≦ 10 μA
Internal Noise:	≦ 35 μVp-p , referred to input
Skinvoltage Tolerance:	≧ ± 300 mV
Leads Off Alarm:	Detected by electrode detachment
AC Filter:	Provided
Pacing Pulse Rejection:	Provided
External Input:	10 mm/V on CRT at gain of × 1
External Output:	1 V/mV
QRS Sync Sound:	Provided with a sound level adjustment
Calibration Waveform:	Square waveform of 1 mV (referred to input)
Test Waveform:	QRS simulated waveform of approx. 1 mV, 100 msec and 60 bpm
Heart Rate Count Range:	12 to 300 bpm
Heart Rate Alarm:	
High limit:	15 to 300 bpm, 5 bpm/step, and off
Low limit:	15 to 295 bpm, 5 bpm/step, and off
VPC Rate Count Range: (TEC-7300)	0 to 99 bpm
VPC Rate Alarm: (TEC-7300)	1 to 99 bpm, 1 bpm/step, and off

MONITOR SECTION

* : When the QI-701VA is used

CRT:	Non-fade, 5.5 inches, electromagnetic deflection type
Effective Display Area:	100H × 85V (mm)
Display Method:	Non-fade, X-Y display
Sweep Speed:	25 mm/sec
Sweep Length:	100 mm
Frequency Response:	DC to 30 Hz (−3 dB)
Max. Waveform Deflection:	40 mm / trace
Baseline Position:	Fixed
Sync Mark	Spot display on a QRS waveform in SYNC mode
Display Mode:	Monitor mode, system set mode, and alarm set mode (TEC-7300) Monitor mode (TEC-7100/7200)
Monitor mode:	
(TEC-7100/7200)	
Cascaded ECG mode:	Displays ECG and cascaded ECG waveform
(TEC-7300)	
Cascaded ECG mode:	Displays ECG and cascaded ECG waveform
VPC Mode:	Displays ECG and VPC frozen / recall waveform, VPC detected time, arrhythmia status, and lead
Recall File Capacity:	10 files
Arrhythmia Status:	Asystole, ventricular fibrillation, ventricular tachycardia, VPC run, couplet, bigeminy, and early VPC
Heart Rate Trend Mode:	Displays ECG and heart rate trendgraph Trendgraph includes maxi-mum, minimum and mean heart rate
VPC Trend Mode:	Displays ECG and VPC trendgraph Trendgraph includes VPC rate and mean heart rate
BP Mode: *	Displays ECG and blood pressure waveform
BP Trend Mode: *	Displays ECG and blood pressure trendgraph Trendgraph includes systolic, diastolic, and mean pressure
Trend Time:	2 min, 1, 2, 4, 8, and 24 hour
Trend Data:	60 samples
System Set Mode: (TEC-7300)	
Set Item:	Trend time, periodic record, pacing rejection on/off, discharge summention print, tabular trend on/off, paper speed, ECG record mode (realtime/delayed), and date and time set.
Alarm Set Mode: (TEC-7300)	
Set Item:	Heart rate high and low limit, VPC rate limit, arrhythmia level, alarm record on/off, and systolic pressure limit *
Arrhythmia Level:	Level 1, level 2 and off
Level 1:	Asystole, ventricular fibrillation, ventricular tachycardia, and VPC run
Level 2:	Besides level 1, couplet, bigeminy, and early VPC

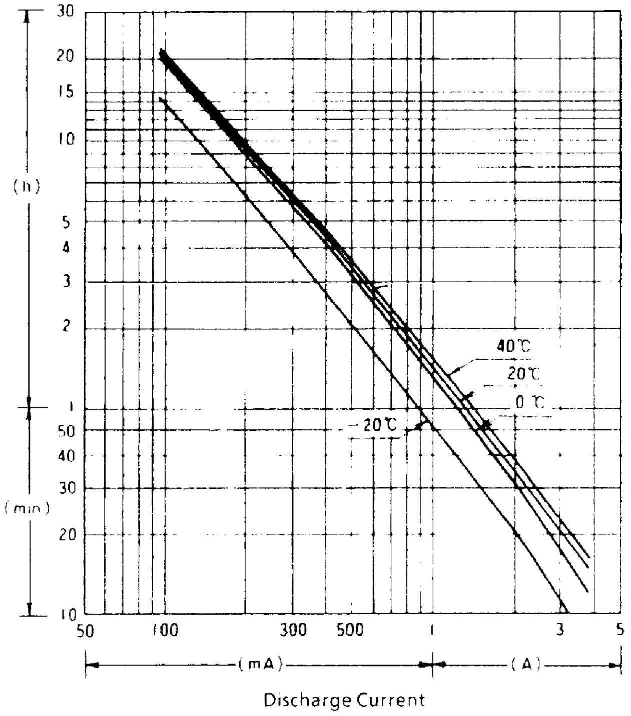
◆ RECORDER SECTION

Recording Item:	Realtime ECG waveform, delayed ECG waveform, and frozen waveform (TEC-7100/7200/7300), recall waveform, trendgraph with/without tabular trend, and discharge summention (TEC-7300)
Paper Speed:	25 mm/sec ± 10% (TEC-7100/7200/7300) 5 mm/sec ± 15% and 5 & 25 mm/sec alternate selection: (TEC-7300)
Effective Recording Width:	40 mm (waveform) , 3 mm/line (characters)
Frequency Response:	DC to 80 Hz (– 3dB)
Auto Recording:	
Energy Charge Recording:	Records for approx. 15 sec when starting energy charge.
Alarm Recording:	Records for approx. 15 sec when an alarm occurs.
Periodic Recording: (TEC-7300)	Records for 10 sec at the interval of 1, 10, 15, 30 min, or 1 hour.
Annotation Printing:	Following items are printed on the upper and lower margin. Items to be annotated depend on the display mode. Discharge mark, selected energy, lead, sensitivity, heart rate, MON/ECG mode, AC filter on/off, REAL/DELAY mode, SYNC mode, sync mark, date, and time (TEC-7100/7200/7300) Transthoracic resistance and delivered energy (TEC-7200/7300)
Recording Paper:	Z-fold paper, type FQS50-3-100, 50 mm × 30 m Roll paper, type RQS50-3, 50 mm × 30 m (requires the optional roll paper adaptor RH-701V)
Paper Empty Sensor:	When the paper is used up, recording stops, intermittent tone is emitted, and "PAPER EMPTY" is displayed on the CRT.

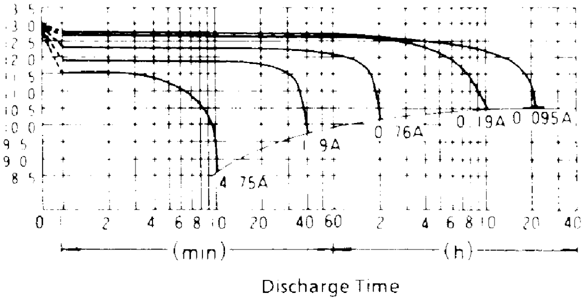
◆ BATTERY

Battery:	LCT-1912NK, lead acid type
Battery Charging Time:	Approximately 2 hours for 80 % charging, and 15 hours for full charge Automatically changed from rapid charging mode to trickle charging mode when fully charged
Capacity:	1.9 AH (20 HR) ≧ 30 times discharge of 360 J by fully charged new battery ≧ 1 hour continuous monitoring by fully charged new battery
Battery Charge Indicator:	Lit (during charging)
Battery Level Indicator:	Battery level is indicated by three LEDs. “LOW BATTERY” is displayed on the CRT when the level is low.
Over-discharge Protector:	Turns off the power when the battery level becomes close to empty to prevent the battery from over-discharge.
Self-discharge:	Battery capacity naturally decreases at temperature of 20°C without using as follows. 3 months: 90 % 6 months: 80 % 12 months: 60 %
Characteristics:	

Relationship between discharge current and time at various temperature

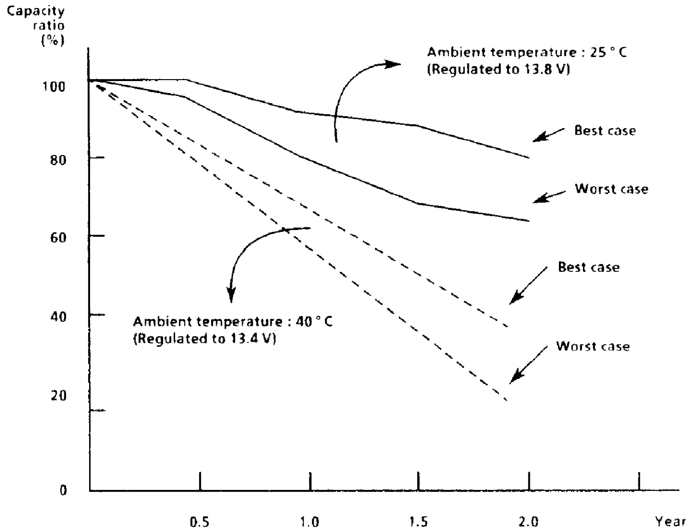


Discharge Characteristic (at 20°C)



Monitoring: Approx. 1A
Recording: Approx. 0.5A
Energy charging: Approx. 8A

Lifetime in Trickle Charging



◆ EXTERNAL PADDLE

Electrode Size: 70 × 106 mm (Adult), 45,8 × 53.8 mm (Pediatric)
Cable Length: 2.5 m

◆ GENERAL

Operating Temperature:	0~35°C
Power Requirement:	Refer to System Component Table (Pg. 1.10 to 1.12).
Power Consumption:	<200VA (TEC-7100/7200) <250VA (TEC-7300)
Dimensions:	344W × 195H × 370D mm (excluding paddles)
Net Weight:	12.3 kg (including paddles, TEC-7100/7200) 12.8 kg (including paddles, TEC-7300)

Section 3 THEORY OF OPERATION

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AC/DC Switching Control 3.80
Relay Control 3.80
DC/DC Switching Control 3.81
Battery Charger 3.82
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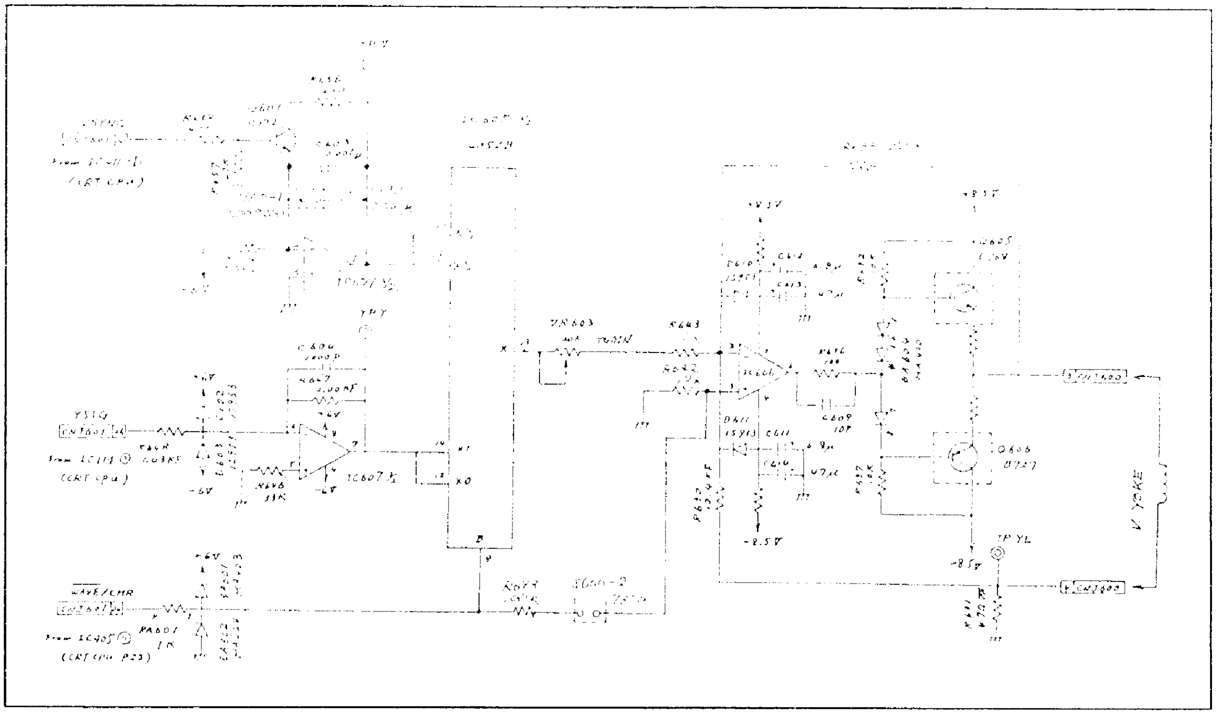
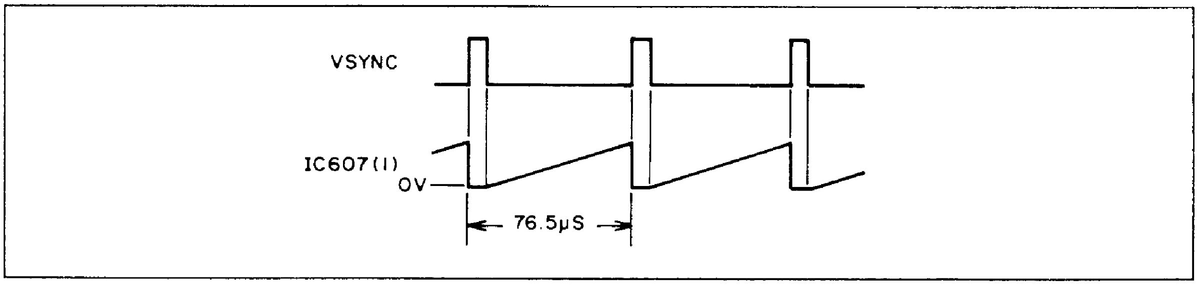
Vertical Deflection Driver


VSYNC
From IC411
(CRT CPU)
Q601
C603
IC605 ½
IC607 ½
TPY
C604
R647
YSIG
CNI601
R648
From IC111
(CRT CPU)
R646
33K
+6V
-6V
IC607 ½
X1
X0
X2
X3
VR603
R643
R642
IC606
D611
C611
C610
C612
C613
R676
C609
10P
Q605
Q606
R697
10K
+8.5V
-8.5V
TP YL
CNJ600
V YOKE
WAVE/CHR
R601
1K
From IC405
(CRT CPU P23)
R673

Character Display Mode

VSYNC triggers the integrator IC607-1 to generate a sawtooth waveform which is amplified by IC606 and Q605~606 to drive the vertical deflection yoke for the vertical scan. While VSYNC is high, Q601 turns on, and IC607-1 is reset to 0V. While low, C603 is charged by −6V to generate a positive sawtooth. Multiplexer IC605-2 selects X2/X3 when WAVE/CHAR is high.

Vertical Scan Sawtooth


VSYNC
IC607(1)
OV
76.5μS

Waveform Display Mode

D/A converted ECG waveform YSIG is amplified by IC607-2 with a gain of 1.4. High-cut filter of 80Hz consists of R647 and C604 to smooth the waveform. Multiplexer IC605-2 selects X0/X1 when WAVE/CHAR is low.

Driver

In the character display mode, when the input voltage of IC606 starts increasing, the output decreases, the base voltage of Q605~606 decreases, the emitter voltage becomes negative, the current flows from CNJ600-4 to CNJ600-3 through the yoke, and the scan is initiated slightly above the top of the character display area. In the waveform display mode, the YSIG controls the vertical yoke current in the same manner. IC606 has two feedback loops. The main feedback is through R630, and the yoke is delayed due to the inductance of the yoke. The feedback through R633 and VR607 compensates this delay to initiate the beam quickly. The amount of the compensation feedback is adjusted with VR607 for the distortion adjustment of characters in the top area. The vertical deflection width is adjusted by VR603.

Jumper Setting for Instrument Type

The jumper J600 is set according to the type of instrument, TEC-7100/7200 or TEC-7300. This selection determines the deflection amplitude (J600-1) and the vertical position (J600-2) of the vertical scan in the character display mode.

	TEC-7100/7200	TEC-7300
J600-1	ON	OFF
J600-2	OFF	ON

3-1 System Overview

This defibrillator is controlled by three CPUs : host CPU, ECG CPU and CRT CPU. The host CPU mainly controls other CPUs and transfers the data among them. Refer to block diagrams on the following pages.

ECG signal processing

The host CPU sends the data such as key status to the ECG RAM. According to this data, the ECG CPU controls the ECG amplifier and A/D converter. An interrupt signal sent regularly from the host CPU to the ECG CPU allows the A/D convertor to start conversion. The converted data is transferred to the host CPU through the ECG RAM. A leads-off signal and a paddle contact impedance signal are also sent to the host CPU.

The ECG CPU detects a QRS synchronization point, and calculates the heart rate for the host CPU. In the TEC-7300, the ECG CPU also detects VPCs and calculates the VPC rate.

CRT display

The host CPU sends data such as key status, waveform, and characters to the CRT CPU through the CRT RAM in a certain cycle. The CRT CPU generates control signals such as sync signal and blanking signal to display waveforms and characters.

Recorder

When the host CPU recognizes that the record key is pressed, the host CPU sends the control signals to the motor control board which controls the rotation of the paper feed motor at a constant speed. The host CPU also sends the serial data to the thermal head to print characters and waveforms.

Energy Charge

The energy charge/discharge is controlled by host CPU according to the key status. The host CPU sends the charge control signal through the I/O port to the energy charge circuit to supply high voltage to the energy capacitor in the high voltage block. During charging, the charged energy is monitored by the host CPU through the A/D converter. When discharged, the energy detected by the TTR circuit is A/D converted and the host CPU calculates the delivered energy (TEC-7200/7300). When discharged to the test load, the host CPU recognizes whether the test discharge has been done normally or not through the test detection circuit.

Key Entry and LED display

The host CPU recognizes key on/off status through the key/LED interface by scanning and I/O port. The LED display is also controlled by the key/LED interface.

Host CPU

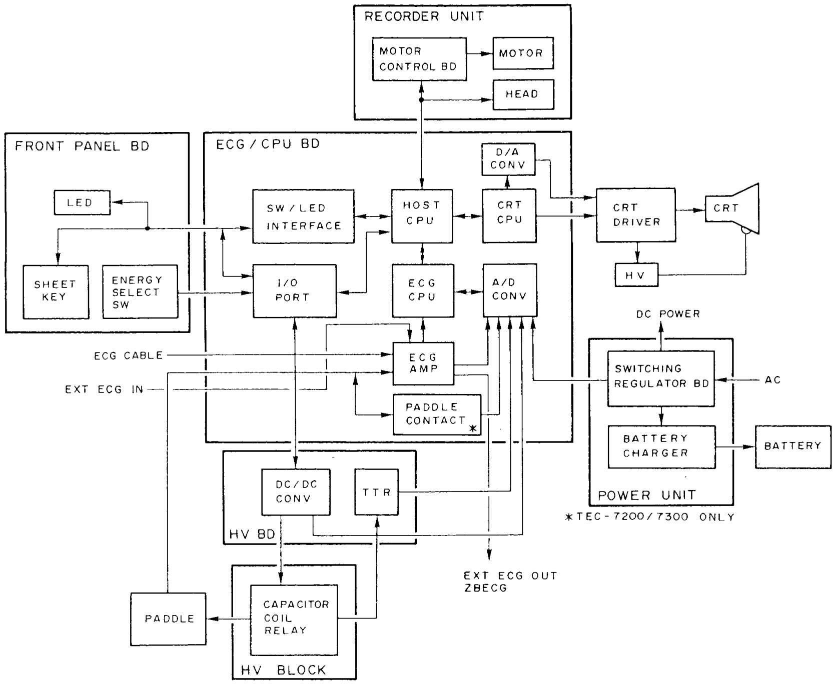
Besides the above, the host CPU controls the various kinds of sound, communicates with the real-time clock and reads the DIP switch setting. When the host CPU runs away and the absence of certain pulses is detected, all CPUs are reset.

Power Unit

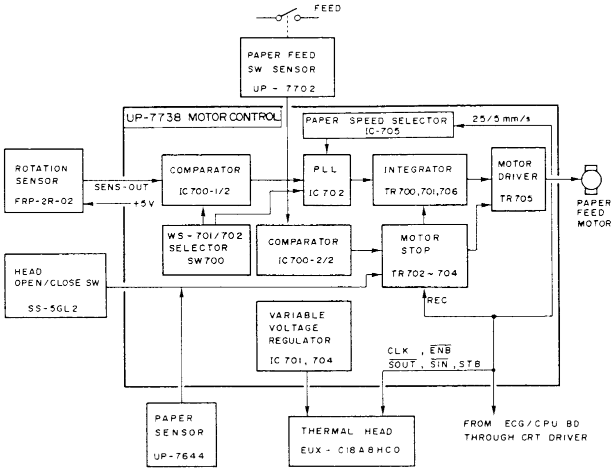
The switching regulator supplies power to all units on AC line or battery. The supply voltage of the power unit is monitored by the host CPU. The battery is charged in the cycle or trickle charging mode.

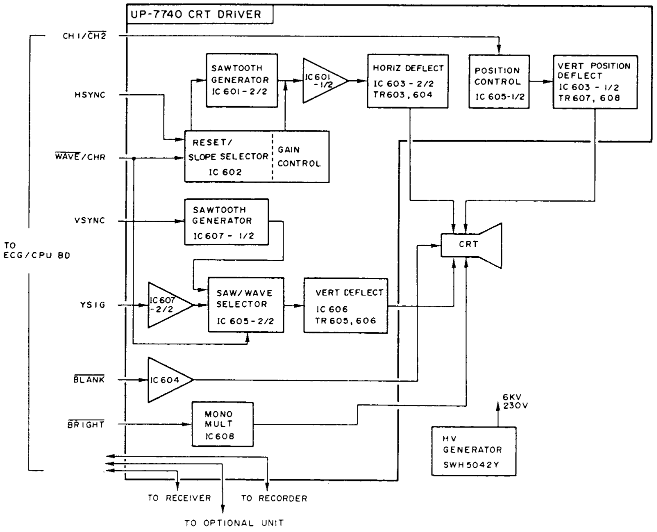
3-2 Block Diagrams

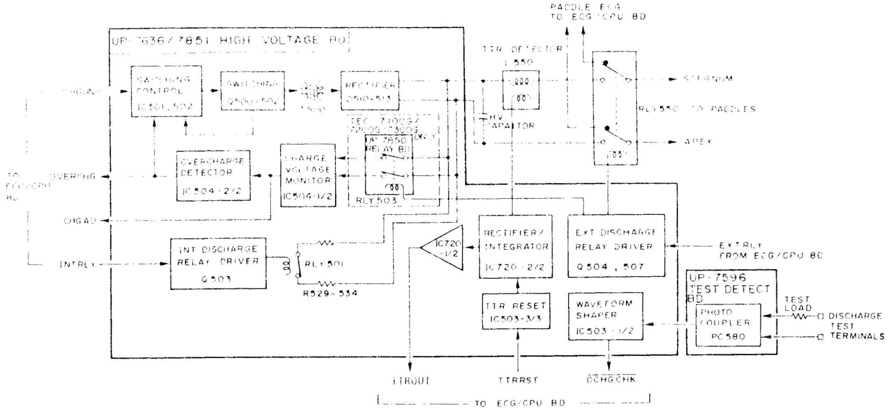
System Block Diagram

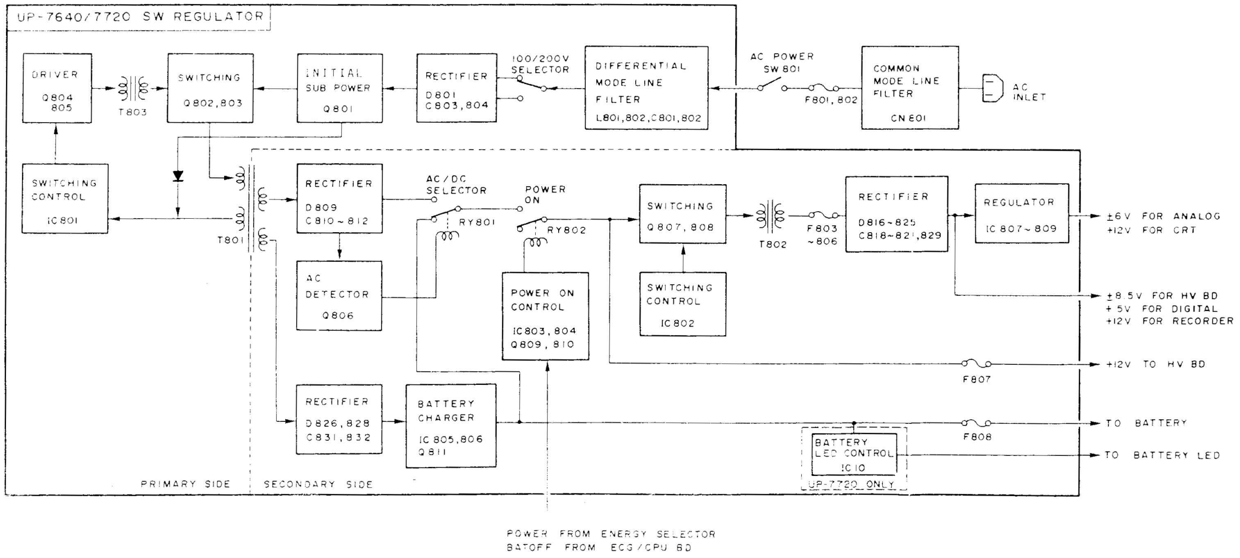

RECORDER UNIT
MOTOR CONTROL BD
MOTOR
HEAD
FRONT PANEL BD
LED
SHEET KEY
ENERGY SELECT SW
ECG/CPU BD
SW/LED INTERFACE
HOST CPU
D/A CONV
CRT CPU
I/O PORT
ECG CPU
A/D CONV
ECG AMP
PADDLE CONTACT *
CRT DRIVER
CRT
HV
DC POWER
SWITCHING REGULATOR BD
AC
BATTERY CHARGER
BATTERY
POWER UNIT
*TEC-7200/7300 ONLY
ECG CABLE
EXT ECG IN
HV BD
DC/DC CONV
TTR
EXT ECG OUT
ZBECG
PADDLE
CAPACITOR
COIL
RELAY
HV BLOCK

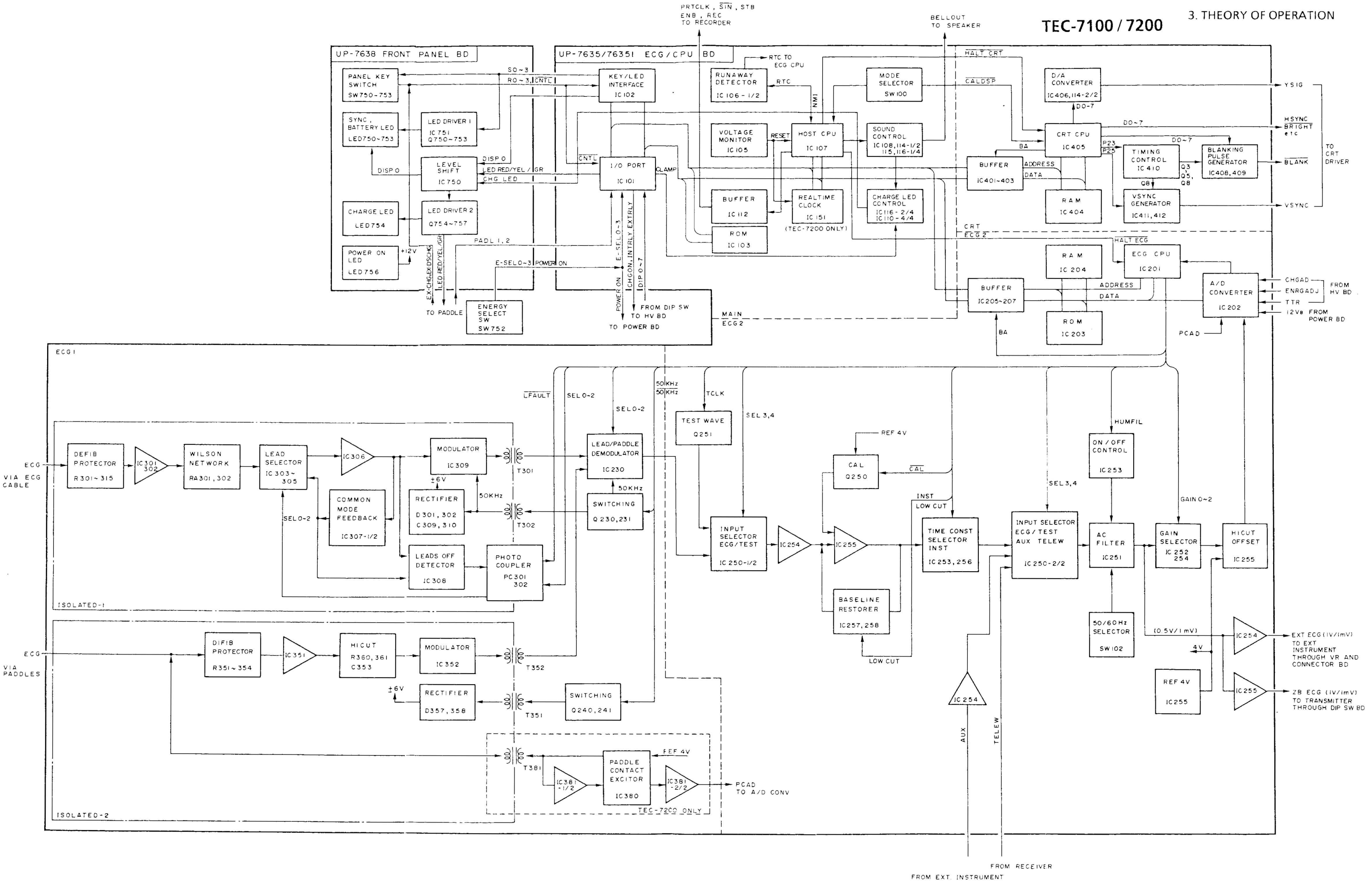
Detailed Block Diagram


FEED
PAPER FEED SW SENSOR UP-7702
UP-7738 MOTOR CONTROL
PAPER SPEED SELECTOR IC-705
25/5 mm/s
ROTATION SENSOR FRP-2R-02
SENS-OUT
+5V
COMPARATOR IC 700-1/2
PLL IC 702
INTEGRATOR TR 700,701,706
MOTOR DRIVER TR 705
PAPER FEED MOTOR
WS-701/702 SELECTOR SW700
COMPARATOR IC 700-2/2
MOTOR STOP TR 702 ~ 704
HEAD OPEN/CLOSE SW SS-5GL2
REC
VARIABLE VOLTAGE REGULATOR IC 701, 704
CLK, $\overline{ENB}$
$\overline{SOUT}$, $\overline{SIN}$, STB
PAPER SENSOR UP-7644
THERMAL HEAD EUX-C18A8HCO
FROM ECG/CPU BD THROUGH CRT DRIVER

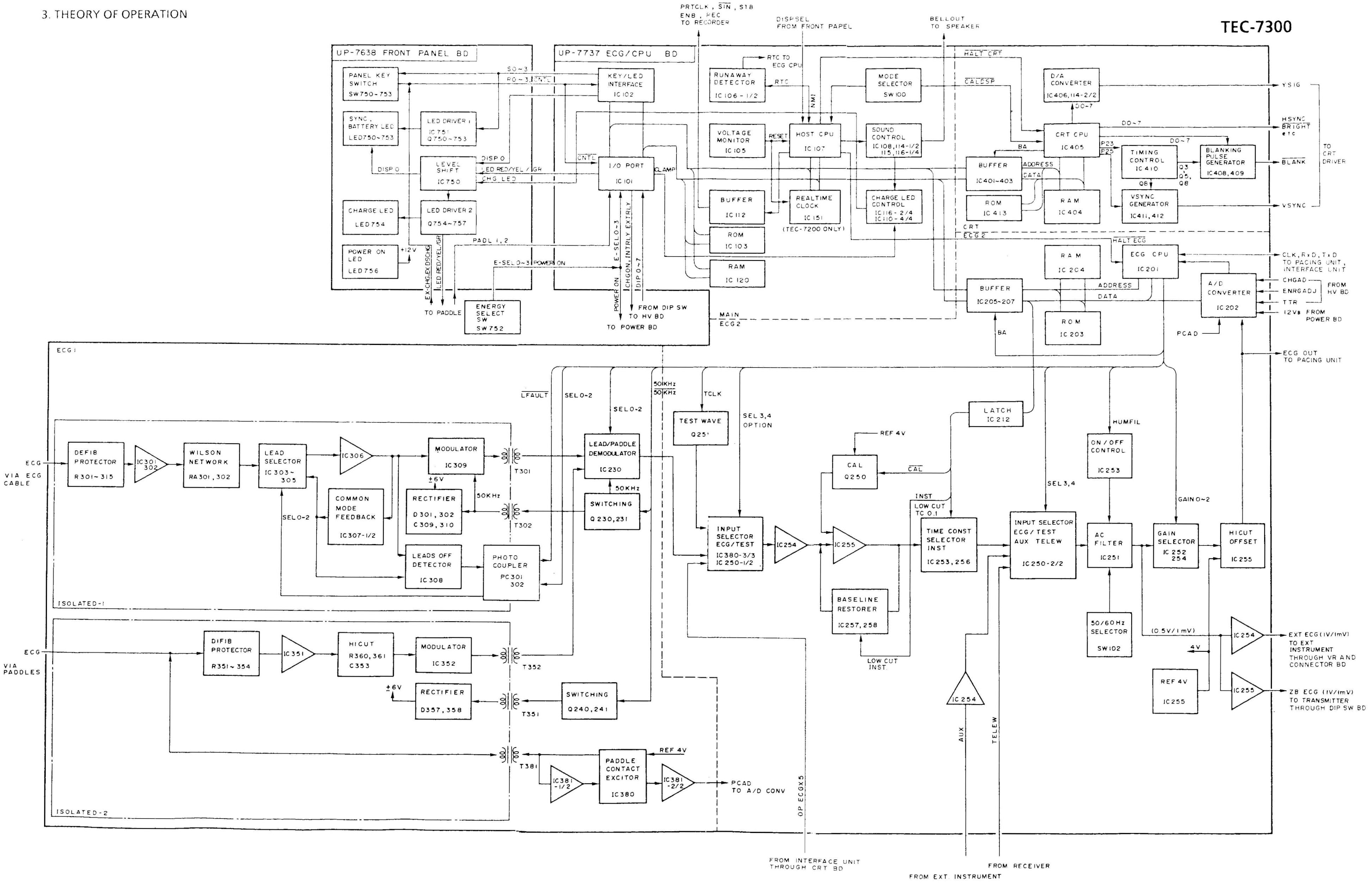

UP-7740 CRT DRIVER
CH1/$\overline{CH2}$
HSYNC
$\overline{WAVE}$/CHR
VSYNC
YSIG
$\overline{BLANK}$
$\overline{BRIGHT}$
TO ECG/CPU BD
SAWTOOTH GENERATOR IC 601-2/2
IC601 -1/2
HORIZ DEFLECT IC 603-2/2 TR603, 604
POSITION CONTROL IC 605-1/2
VERT POSITION DEFLECT IC 603-1/2 TR607, 608
RESET/ SLOPE SELECTOR IC 602
GAIN CONTROL
SAWTOOTH GENERATOR IC 607-1/2
IC607 -2/2
SAW/WAVE SELECTOR IC 605-2/2
VERT DEFLECT IC 606 TR605, 606
CRT
IC604
MONO MULT IC608
6KV 230V
HV GENERATOR SWH5042Y
TO RECEIVER
TO RECORDER
TO OPTIONAL UNIT


UP-7636/7851 HIGH VOLTAGE BD
CHGON
SWITCHING CONTROL
IC501, 502
SWITCHING
Q500~502
T500
RECTIFIER
Q510~513
TEC 7100G/7200G/7300G ONLY
UP-7850 RELAY BD
RLY503
TO ECG/CPU BD
OVERCHG
OVERCHARGE DETECTOR
IC504-2/2
CHARGE VOLTAGE MONITOR
IC504-1/2
CHGAD
INTRLY
INT DISCHARGE RELAY DRIVER
Q503
RLY501
R529~534
IC720-1/2
PADDLE ECG TO ECG/CPU BD
TTR DETECTOR
L550
HV CAPACITOR
STERNUM
RLY550 TO PADDLES
APEX
RECTIFIER/INTEGRATOR
IC720-2/2
EXT DISCHARGE RELAY DRIVER
Q504, 507
EXTRLY FROM ECG/CPU BD
TTR RESET
IC503-3/3
WAVEFORM SHAPER
IC503-1/2
UP-7596 TEST DETECT BD
PHOTO COUPLER
PC580
TEST LOAD
DISCHARGE TEST TERMINALS
TTROUT
TTRRST
$\overline{DCHGCHK}$
TO ECG/CPU BD


UP-7640/7720 SW REGULATOR
DRIVER
Q804
805
T803
SWITCHING
Q802,803
INITIAL SUB POWER
Q801
RECTIFIER
D801
C803,804
100/200V SELECTOR
DIFFERENTIAL MODE LINE FILTER
L801,802,C801,802
AC POWER SW801
F801, 802
COMMON MODE LINE FILTER
CN601
AC INLET
SWITCHING CONTROL
IC801
T801
RECTIFIER
D809
C810~812
AC/DC SELECTOR
RY801
POWER ON
RY802
SWITCHING
Q807, 808
T802
F803~806
RECTIFIER
D816~825
C818~821,829
REGULATOR
IC 807~809
±6V FOR ANALOG
+12V FOR CRT
AC DETECTOR
Q806
POWER ON CONTROL
IC803, 804
Q809, 810
SWITCHING CONTROL
IC802
±8.5V FOR HV BD
+5V FOR DIGITAL
+12V FOR RECORDER
F807
+12V TO HV BD
RECTIFIER
D826, 828
C831, 832
BATTERY CHARGER
IC 805, 806
Q811
F808
TO BATTERY
BATTERY LED CONTROL
IC10
UP-7720 ONLY
TO BATTERY LED
PRIMARY SIDE
SECONDARY SIDE
POWER FROM ENERGY SELECTOR
BATOFF FROM ECG/CPU BD


PRTCLK , SIN , STB
ENB , REC
TO RECORDER
BELLOUT
TO SPEAKER
UP-7638 FRONT PANEL BD
PANEL KEY SWITCH SW750~753
SYNC, BATTERY LED LED750~753
LED DRIVER 1 IC751 Q750~753
LEVEL SHIFT IC750
CHARGE LED LED754
LED DRIVER 2 Q754~757
POWER ON LED LED756
+12V
S0~3
R0~3, CNTL
DISP 0
LED RED/YEL/GR
CHG LED
PADL 1, 2
E-SEL0~3
POWER ON
EX-CHG,EX-DSCHG
LED RED/YEL/GR
TO PADDLE
ENERGY SELECT SW SW752
UP-7635/76351 ECG/CPU BD
KEY/LED INTERFACE IC102
CNTL
I/O PORT IC101
CLAMP
POWER ON
E-SEL0~3
CHGON, INTRLY, EXTRLY
DIP 0~7
TO POWER BD
TO HV BD
FROM DIP SW
RUNAWAY DETECTOR IC106-1/2
RTC TO ECG CPU
RTC
NMI
VOLTAGE MONITOR IC105
RESET
HOST CPU IC107
MODE SELECTOR SW100
SOUND CONTROL IC108,114-1/2 115,116-1/4
BUFFER IC112
REALTIME CLOCK IC151
(TEC-7200 ONLY)
CHARGE LED CONTROL IC116-2/4 IC110-4/4
ROM IC103
HALT CRT
CALDSP
D/A CONVERTER IC406,114-2/2
D0~7
CRT CPU IC405
BA
P23
P25
BUFFER IC401~403
ADDRESS
DATA
RAM IC404
TIMING CONTROL IC410
Q3, Q5, Q8
Q8
BLANKING PULSE GENERATOR IC408,409
VSYNC GENERATOR IC411,412
YSIG
HSYNC BRIGHT etc
BLANK
VSYNC
TO CRT DRIVER
CRT
ECG 2
HALT ECG
RAM IC204
ECG CPU IC201
BUFFER IC205~207
ROM IC203
A/D CONVERTER IC202
CHGAD
ENRGADJ
TTR
12VB FROM POWER BD
FROM HV BD
PCAD
MAIN
ECG2
ECG1
LFAULT
SEL0~2
50KHz
50KHz
TCLK
SEL 3,4
TEST WAVE Q251
REF 4V
CAL Q250
CAL
INST
LOW CUT
SEL 3,4
HUMFIL
ON/OFF CONTROL IC253
GAIN 0~2
ECG
VIA ECG CABLE
DEFIB PROTECTOR R301~315
IC301 302
WILSON NETWORK RA301,302
LEAD SELECTOR IC303~305
IC306
MODULATOR IC309
T301
LEAD/PADDLE DEMODULATOR IC230
COMMON MODE FEEDBACK IC307-1/2
SEL0~2
±6V
RECTIFIER D301,302 C309,310
50KHz
T302
SWITCHING Q230,231
LEADS OFF DETECTOR IC308
PHOTO COUPLER PC301 302
ISOLATED-1
INPUT SELECTOR ECG/TEST IC250-1/2
IC254
IC255
BASELINE RESTORER IC257,258
LOW CUT
TIME CONST SELECTOR INST IC253,256
INPUT SELECTOR ECG/TEST AUX TELEW IC250-2/2
AC FILTER IC251
GAIN SELECTOR IC252 254
HICUT OFFSET IC255
50/60Hz SELECTOR SW102
(0.5V/1mV)
4V
REF 4V IC255
IC254
EXT ECG (1V/1mV) TO EXT INSTRUMENT THROUGH VR AND CONNECTOR BD
IC255
ZB ECG (1V/1mV) TO TRANSMITTER THROUGH DIP SW BD
ECG
VIA PADDLES
DIFIB PROTECTOR R351~354
IC351
HICUT R360,361 C353
MODULATOR IC352
T352
±6V
RECTIFIER D357,358
T351
SWITCHING Q240,241
T381
IC381-1/2
PADDLE CONTACT EXCITOR IC380
REF 4V
IC381-2/2
PCAD TO A/D CONV
TEC-7200 ONLY
ISOLATED-2
IC254
AUX
TELEW
FROM EXT INSTRUMENT
FROM RECEIVER

TEC-7300


PRTCLK, SIN, S18
ENB, REC
TO RECORDER
DISPSEL
FROM FRONT PAPEL
BELLOUT
TO SPEAKER
UP-7638 FRONT PANEL BD
UP-7737 ECG/CPU BD
PANEL KEY SWITCH SW750~753
SYNC, BATTERY LED LED750~753
LED DRIVER 1 IC751 Q750~753
LEVEL SHIFT IC750
CHARGE LED LED754
LED DRIVER 2 Q754~757
POWER ON LED LED756
+12V
KEY/LED INTERFACE IC102
I/O PORT IC101
SO~3
PO~3, CNTL
DISP O
LED RED/YEL/GR
CHG LED
CNTL
CLAMP
PADL 1, 2
E-SEL O~3
POWER ON
EX.CHG.EX.DSCHG
LED RED/YEL/GR
TO PADDLE
ENERGY SELECT SW SW752
E-SEL O~3
CHGON, INTRLY, EXTRLY
DIP O~7
FROM DIP SW
TO HV BD
TO POWER BD
RUNAWAY DETECTOR IC106-1/2
RTC TO ECG CPU
RTC
NMI
VOLTAGE MONITOR IC105
RESET
HOST CPU IC107
MODE SELECTOR SW100
SOUND CONTROL IC108, 114-1/2, 115, 116-1/4
BUFFER IC112
REALTIME CLOCK IC151
(TEC-7200 ONLY)
CHARGE LED CONTROL IC116-2/4, IC110-4/4
ROM IC103
RAM IC120
HALT CRT
CALCSP
D/A CONVERTER IC406, 114-2/2
DO~7
CRT CPU IC405
BA
P23
P25
TIMING CONTROL IC410
BLANKING PULSE GENERATOR IC408, 409
Q3, Q5, Q8
Q6
VSYNC GENERATOR IC411, 412
BUFFER IC401~403
ADDRESS
DATA
ROM IC413
RAM IC404
YSIG
HSYNC BRIGHT etc
BLANK
VSYNC
TO CRT DRIVER
CRT
ECG 2
HALT ECG
RAM IC204
ECG CPU IC201
BUFFER IC205~207
ADDRESS
DATA
ROM IC203
BA
A/D CONVERTER IC202
CLK, RxD, TxD TO PACING UNIT, INTERFACE UNIT
CHGAD
ENRGADJ
TTR
12VB
FROM HV BD
FROM POWER BD
PCAD
ECG OUT TO PACING UNIT
MAIN
ECG 2
ECG 1
LFAULT
SEL O~2
50KHz
TCLK
ECG VIA ECG CABLE
DEFIB PROTECTOR R301~315
IC301 302
WILSON NETWORK RA301, 302
LEAD SELECTOR IC303~305
IC306
MODULATOR IC309
T301
±6V
RECTIFIER D301, 302 C309, 310
50KHz
T302
COMMON MODE FEEDBACK IC307-1/2
SEL O~2
LEADS OFF DETECTOR IC308
PHOTO COUPLER PC301 302
LEAD/PADDLE DEMODULATOR IC230
50KHz
SWITCHING Q230, 231
ISOLATED-1
TEST WAVE Q251
SEL 3,4 OPTION
INPUT SELECTOR ECG/TEST IC380-3/3 IC250-1/2
IC254
REF 4V
CAL Q250
CAL
IC255
BASELINE RESTORER IC257, 258
LOW CUT INST.
LATCH IC212
INST
LOW CUT TC 0.1
TIME CONST SELECTOR INST IC253, 256
SEL 3,4
INPUT SELECTOR ECG/TEST AUX TELEW IC250-2/2
HUMFIL
ON/OFF CONTROL IC253
AC FILTER IC251
50/60Hz SELECTOR SW102
GAIN O~2
GAIN SELECTOR IC252 254
HICUT OFFSET IC255
(0.5V/1mV)
4V
REF 4V IC255
IC254
EXT ECG (1V/1mV) TO EXT INSTRUMENT THROUGH VR AND CONNECTOR BD
IC255
ZB ECG (1V/1mV) TO TRANSMITTER THROUGH DIP SW BD
ECG VIA PADDLES
DIFIB PROTECTOR R351~354
IC351
HICUT R360, 361 C353
MODULATOR IC352
T352
±6V
RECTIFIER D357, 358
T351
SWITCHING Q240, 241
T381
IC381-1/2
PADDLE CONTACT EXCITOR IC380
REF 4V
IC381-2/2
PCAD TO A/D CONV
ISOLATED-2
OP ECGX5
IC254
AUX
TELEW
FROM INTERFACE UNIT THROUGH CRT BD
FROM EXT INSTRUMENT
FROM RECEIVER

3-3 ECG/CPU Board UP-7635/76351/7737

ECG/CPU Board consists of four blocks : ECG amplifier, ECG CPU, host CPU and CRT CPU section. Front panel board UP-7638 is also described in the host CPU section.

ROM Version Display

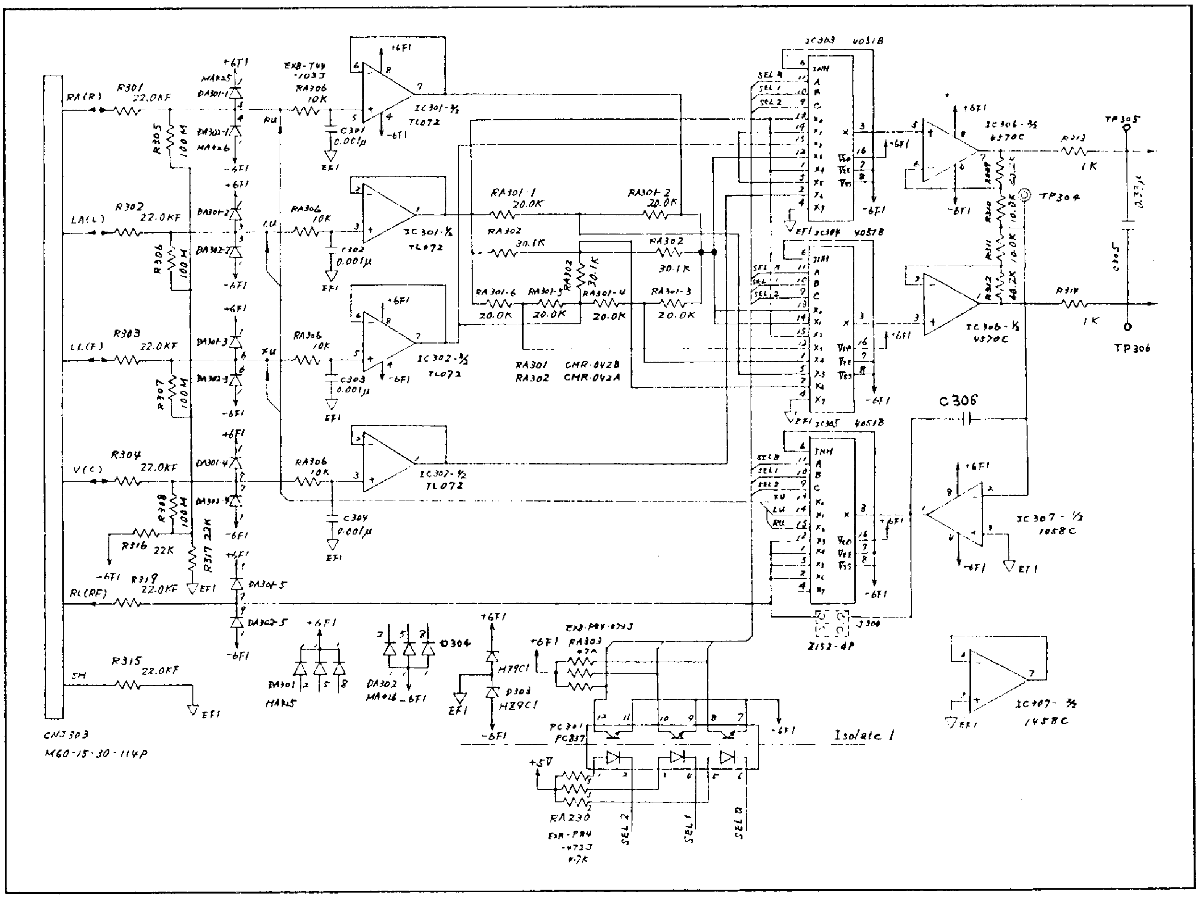
The version of ROMs on the ECG/CPU board can be displayed by following operations.

TEC-7100/7200: Turn on the power while pressing the ↑ key.

TEC-7300: Press both CAL and FREEZE key simultaneously.

3-3-1 ECG Amplifier

ECG Input and Lead Selection


RA(R)
R301 22.0KF
LA(L)
R302 22.0KF
LL(F)
R303 22.0KF
V(C)
R304 22.0KF
RL(RF)
R319 22.0KF
SH
R315 22.0KF
R305 100M
R306 100M
R307 100M
R308 100M
R316 22K
R317 22K
CNJ303
M60-15-30-114P
+6F1
-6F1
EF1
MA425
DA301-1
DA302-1
MA426
DA301-2
DA302-2
DA301-3
DA302-3
DA301-4
DA302-4
DA301-5
DA302-5
DA301
MA425
DA302
MA426
D304
D303
HZ9C1
RU
LU
FU
EXB-T44
-103J
RA306
10K
C301 0.001μ
C302 0.001μ
C303 0.001μ
C304 0.001μ
IC301-½
TL072
IC302-½
TL072
RA301-1 20.0K
RA301-2 20.0K
RA302 30.1K
RA301-6 20.0K
RA301-5 20.0K
RA301-4 20.0K
RA301-3 20.0K
RA301 CMR-842B
RA302 CMR-842A
IC303 4051B
IC304 4051B
IC305 4051B
INH
A
B
C
SEL 0
SEL 1
SEL 2
IC306-½
4570C
R313 1K
R314 1K
TP305
TP304
TP306
C305
0.33μ
R309
R310
R311
R312
C306
IC307-½
1458C
J306
2152-4P
EXB-P84-473J
RA303
47K
PC301
PC837
+5V
RA230
EXB-P84
-472J
4.7K
Isolate 1

The ECG signals are selected as a lead and sent to the modulator. To improve CMRR, a common mode signal is fed back to the reference electrode.

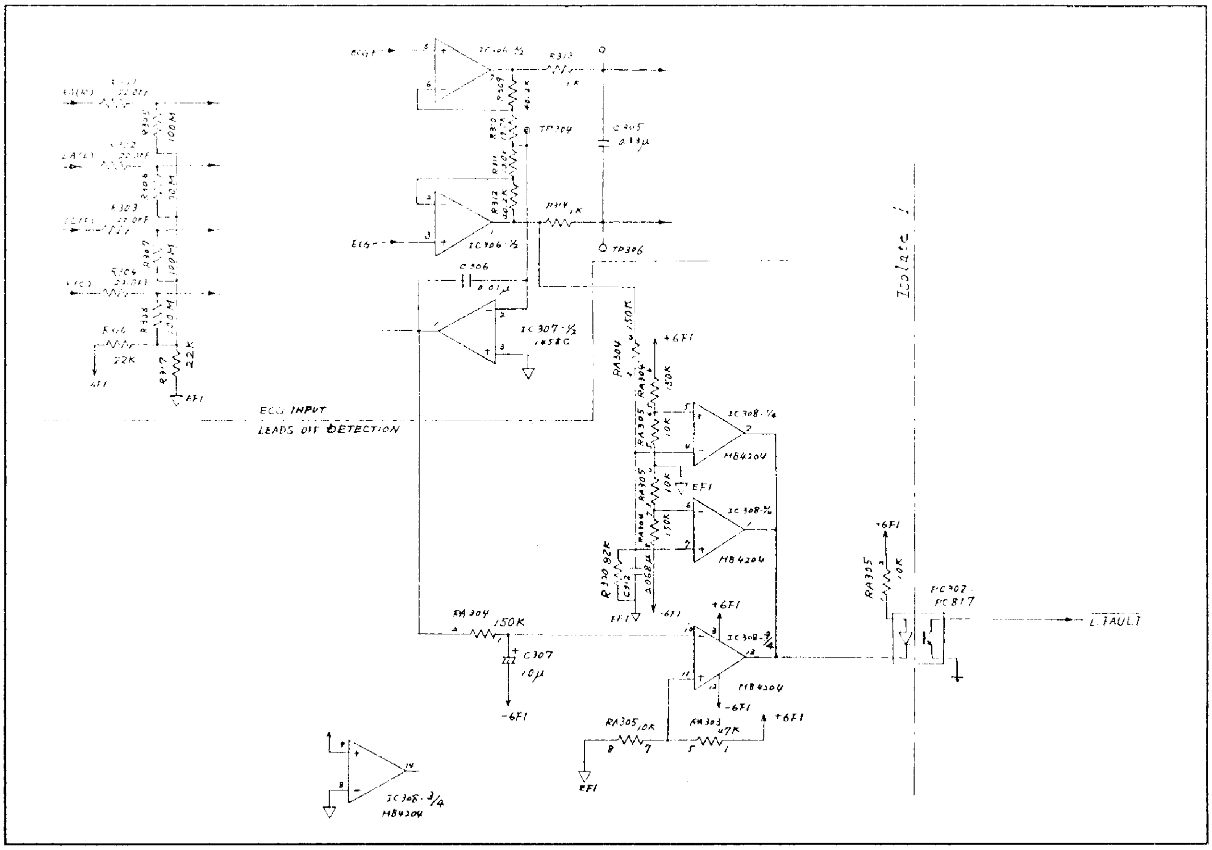
The ECG signals are sent to the buffer amplifier IC301~302. R301~304, RA306 and C301~304 compose the high-cut filter of 5KHz to eliminate high frequency noise. DA301~302 limit the excessive input voltage for circuit protection. R305~308, 316 and 317 reduce the input to – 3V when an electrode is detached for leads-off detection. The outputs of the Wilson network RA301 ~ 302 are selected by the multiplexer IC303~304. Control signals (+5V/0V) from the ECG CPU are isolated and converted to (+6V/–6V) by the photocoupler PC301. Relationship between control signals (SEL 0~2) and selected leads are as follows.

Lead Selection IC303 ~ 304

Control			Out			Lead
SEL0	SEL1	SEL2	X	IC303	IC304	
0	0	0	X0	LA (L)	RA (R)	I
0	0	1	X1	LL(F)	RA (R)	II
0	1	0	X2	LL(F)	LA (L)	III
0	1	1	X3	RA (R)	LL(F) & LA (L)	aVR
1	0	0	X4	LA (L)	LL(F) & RA(R)	aVL
1	0	1	X5	LL(F)	RA (R) & LA (L)	aVF
1	1	0	X6	V (C)	RA (R), LA (L) & LL(F)	V
1	1	1	X7	EF1	EF1	OFF (Paddle Lead)

Selected signals are amplified by IC306 with a gain of 5 (=(R310+R309)/R310=(R311+R312)/R311). R313~314 and C305 compose the high-cut filter of 240Hz. A common mode signal at TP304 is fed back to the reference electrode by the comparator IC307-1. See leads-off section for the selection of IC305. Even when excessive voltage is input and DA301~302 are turned on, the power supply voltage is maintained within ±9V by D303~304.

Leads-off Detection

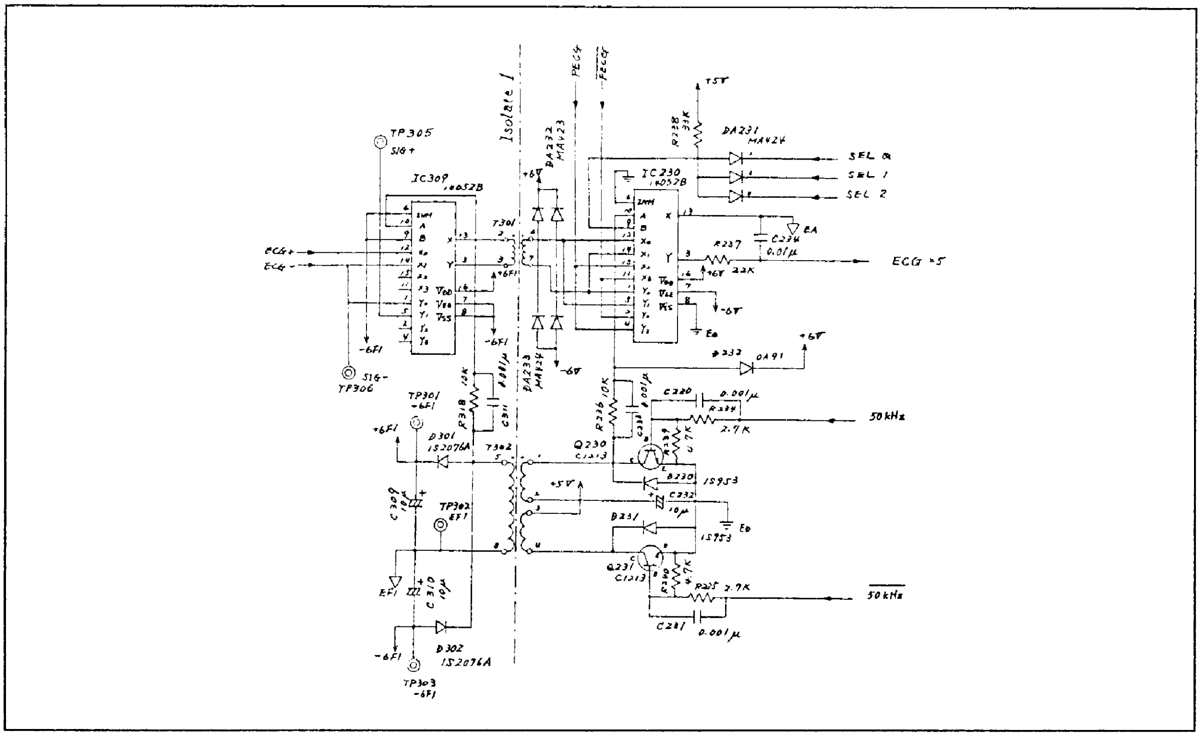

R305 100M
R306 10M
R303
R307 100M
R304
R308 10M
R316 22K
R317 22K
ECG+
IC306 ½
R313 1K
R309 40.2K
R310
TP304
R311
R312 40.2K
C305 0.33μ
R314 1K
ECG−
IC306 ½
TP306
C306 0.01μ
IC307 ½
ECG INPUT
LEADS OFF DETECTION
RA304 150K
+6F1
RA305 10K
IC308 ¼
MB4204
EF1
IC308 ²⁄₄
R330 82K
C312 0.068μ
-6F1
RA304 150K
C307 10μ
+6F1
IC308 ⁴⁄₄
RA305 10K
RA303 47K
IC308 ³⁄₄
MB4204
Isolate
RA305 10K
PC302 PC817
L FAULT

Although RA (R), LA (L), LL (F) and V (C) electrodes reduced down to −3V through R305~308 for leads-off detection, the comparator IC307-1 feeds back current to active electrodes through the reference electrode and patient body to cancel common mode signal with the offset of −3V at TP304. Therefore, normally −3V does not affect the ECG signal. When an electrode is detached, feedback is not balanced, the output greatly deviates and leads-off is detected. Details concerning the detached electrode are as follows.

When a reference electrode is detached, the potential of the active electrodes becomes −3V because of no feedback current, −3V appears at TP304, comparator IC307-1 becomes high, comparator IC308-4 becomes low and photocoupler PC817 outputs a low LFAULT signal.

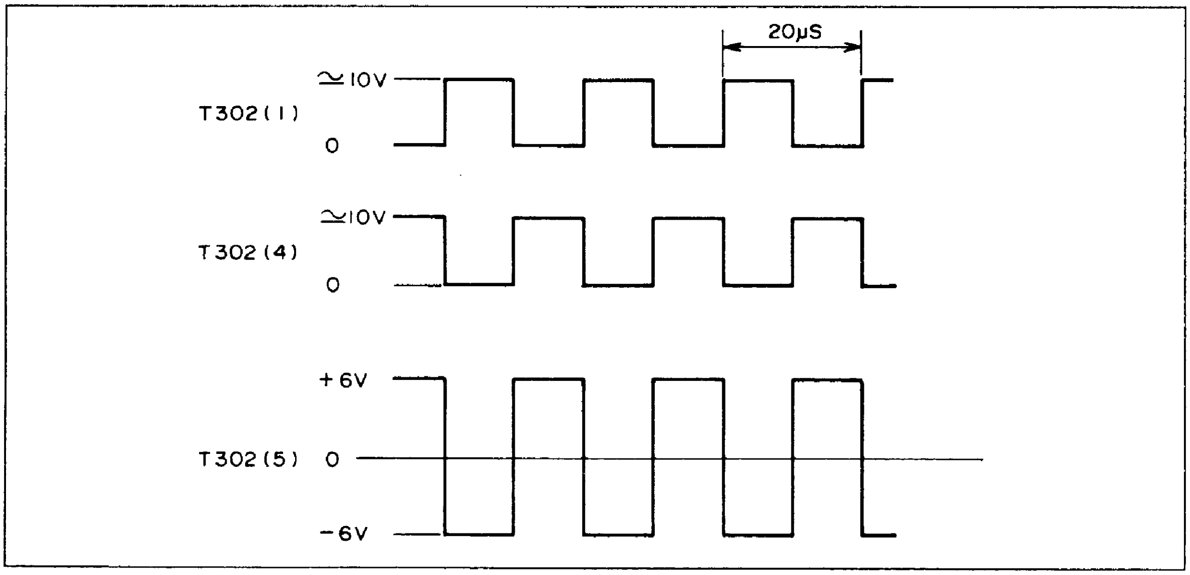
When an active electrode is detached, for example, in leads I~III, the potential of the detached electrode becomes −3V. IC307-1 feeds back current to the other active electrode to generate +3V. IC306 (1) saturates to positive or negative. Either comparator IC308-1 or IC308-2 becomes low (IC308 outputs are open collectors) and photocoupler PC817 outputs a low LFAULT signal.

ECG Isolation


TP305
SIG+
IC309 4052B
ECG+
ECG−
TP306
SIG−
T301
T302
Isolate 1
DA232 MA423
DA233 MA424
PECG
FECG
+5V
R238 33K
DA231 MA424
SEL 0
SEL 1
SEL 2
IC230 4052B
C234 0.01μ
R237 22K
ECG ×5
+6V
−6V
D232 OA91
C230 0.001μ
R234 2.7K
50kHz
R236 10K
Q230 C1213
D230 1S953
C232 10μ
D231 1S953
Q231 C1213
R235 2.7K
C231 0.001μ
50kHz
TP301 +6FI
D301 1S2076A
C309
TP302 EFI
C310
D302 1S2076A
TP303 −6FI
R318 10K
C311 0.001μ

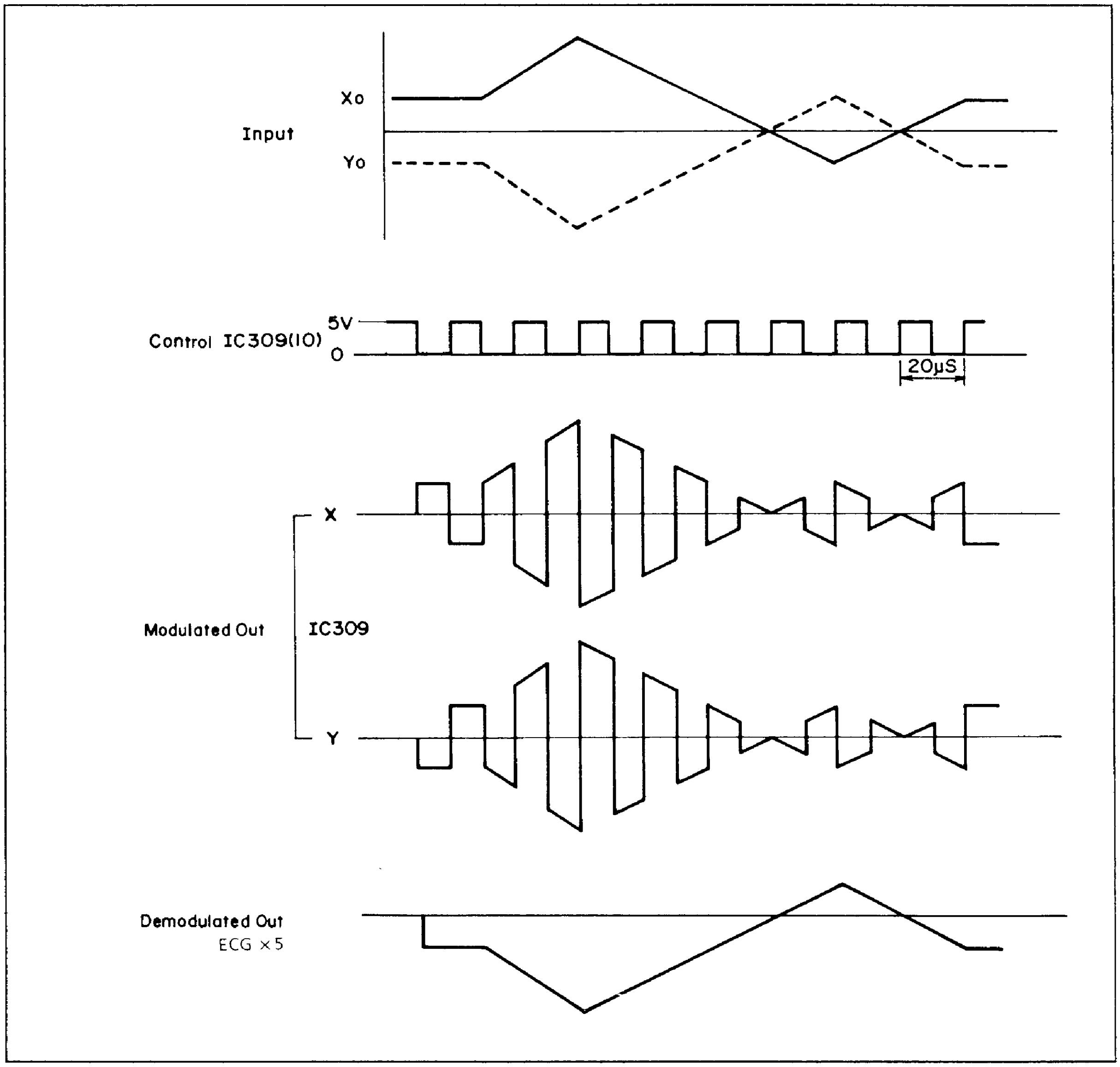
Q230~231 controlled by 50kHz clock from the ECG CPU, switch +5V for the primary winding of the isolation transformer T302. At the secondary winding of T302, the positive and negative cycle are half-wave rectified, respectively, to provide ± 6V floating power supply.

ECG Isolation Transformer Switching

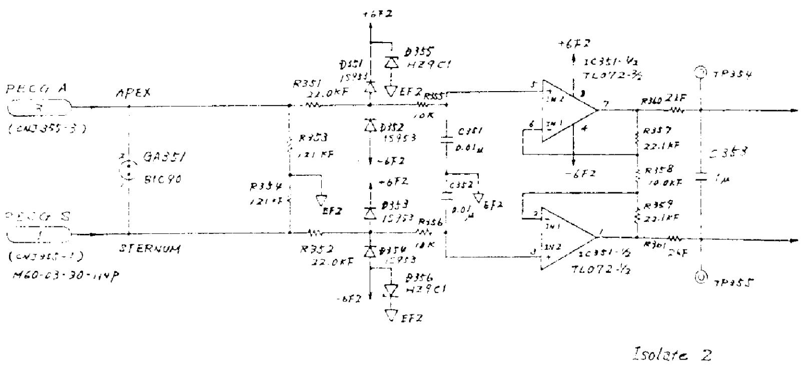


ECG Modulation / Demodulation

The output of T302 controls the multiplexer IC309 to modulate the ECG waveform. The modulated ECG waveform is transferred through T301 and demodulated by IC230. DA232~233 limit the T301 output voltage to approximately the power voltage. IC230 selects either standard lead ECG or paddle lead ECG controlled by SEL0~2.

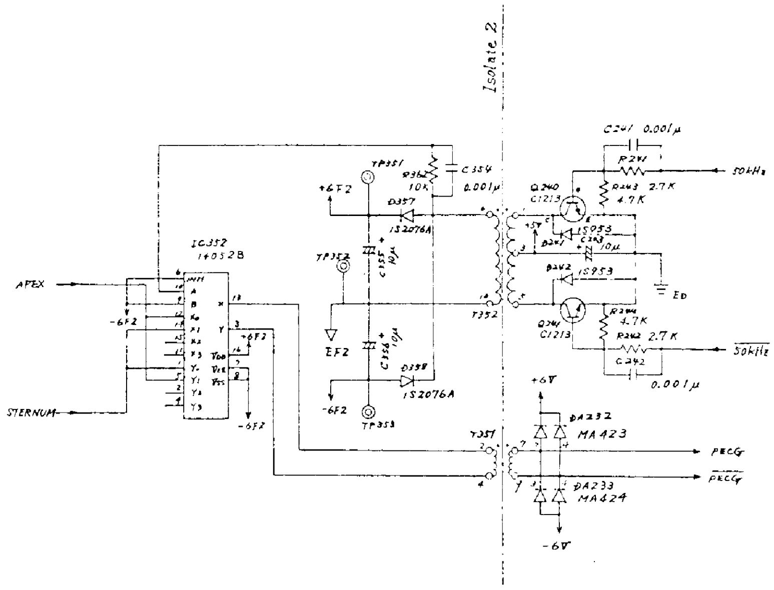

Input
Xo
Yo
Control IC309(10)
5V
0
20μS
X
Modulated Out
IC309
Y
Demodulated Out
ECG ×5

Paddle Lead ECG Input

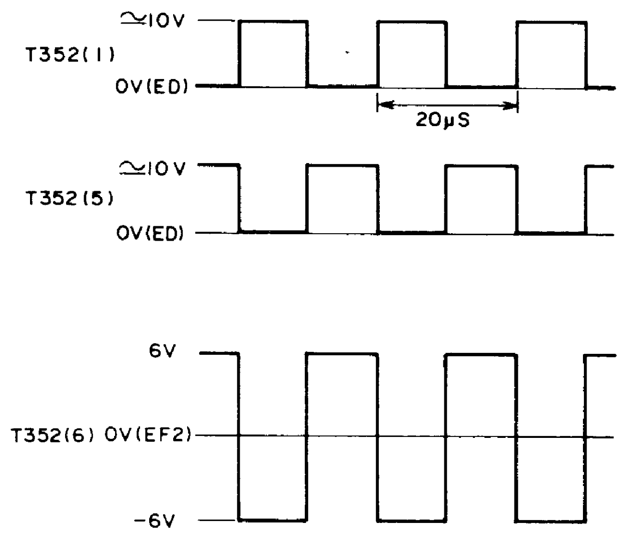

+6F2
D355
HZ9C1
D351
1S953
R351
22.0KF
EF2
R355
10K
PECG A
APEX
R
(CNJ355-3)
D352
1S953
C351
0.01μ
R353
121KF
-6F2
GA351
BIC90
+6F2
C352
0.01μ
EF2
R354
121KF
EF2
D353
1S953
R356
PECG S
S
(CNJ355-1)
M60-03-30-11NP
STERNUM
R352
22.0KF
D354
1S953
10K
D356
HZ9C1
-6F2
EF2
+6F2
IC351-½
TL072-½
5
IN2
6
IN1
4
7
-6F2
R360 21F
R357
22.1KF
R358
10.0KF
R359
22.1KF
2
IN1
3
IN2
1
IC351-½
TL072-½
R361
21F
TP354
C353
1μ
TP355
Isolate 2

Paddle lead ECG is input through the external discharge relay RLY550 to CNJ355. Input impedance is 242kΩ determined by R353~354. The high-cut filter of 497Hz is composed of R351, R355, C351, R352, R356 and C352 to eliminate high frequency noise. The gain of IC351 is 5.4 (=(R357+R359)/R358+1). The high-cut filter of 40Hz is composed of R360, R361, and C353. Even when excessive voltage is input and D351~354 are turned on, the power supply voltage is maintained within ±9V by D355~356. R351~352 limit current for excessive input to protect D351~354.

Paddle Lead ECG Isolation

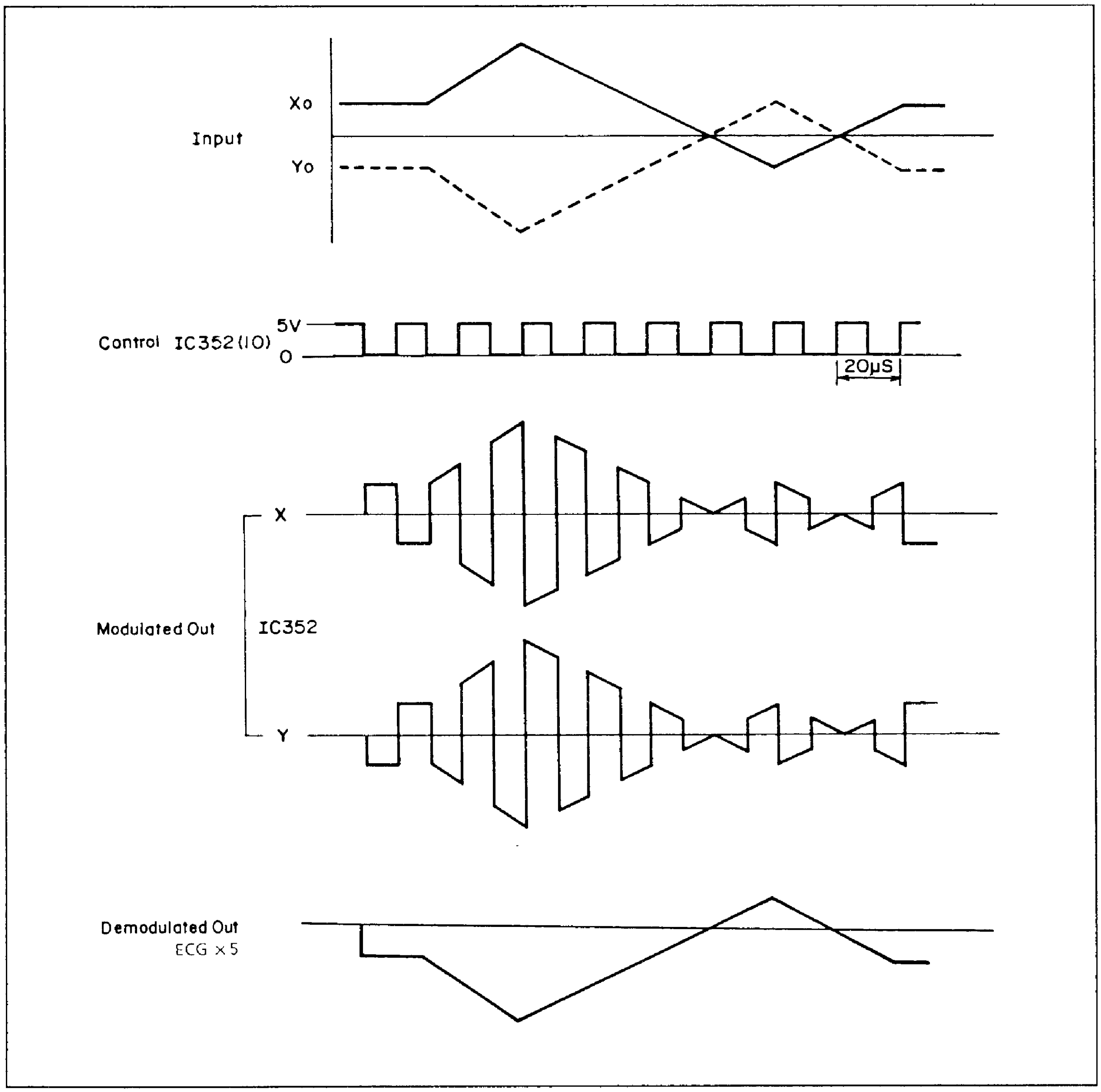

Isolate 2
C241 0.001μ
R241
50kHz
R243 2.7K
4.7K
Q240
C1213
TP351
R362
10K
C354
0.001μ
+6F2
D357
1S2076A
+5V
D241
1S953
C243
10μ
D242
1S953
ED
IC352
14052B
APEX
-6F2
STERNUM
INH
A
B
X0
X1
X2
X3
Y0
Y1
Y2
Y3
X
Y
VDD
VEE
VSS
+6F2
-6F2
TP352
C355 10μ
T352
EF2
C356 10μ
D358
1S2076A
-6F2
TP353
Q241
C1213
R244
4.7K
R242 2.7K
50kHz
C242
0.001μ
+6V
DA232
MA423
T351
PECG
PECG
DA233
MA424
-6V

Q240~241 switches +5V controlled by 50kHz clock from the ECG CPU for the primary winding of the isolation transformer T352. At the secondary winding of T352, the positive and negative cycle are half-wave rectified, respectively, to provide ±6V floating power supply.

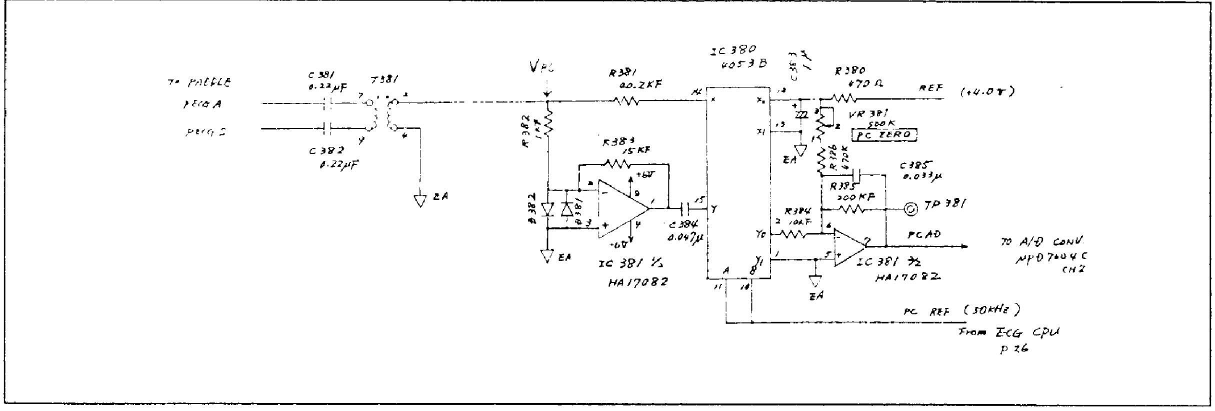


ECG Modulation / Demodulation

The output of T352 controls the multiplexer IC352 to modulate the ECG waveform. The modulated ECG waveform is transferred through T351 and demodulated by IC230. DA232~233 limit the T351 output voltage to approximately the power voltage. IC230 selects either standard lead ECG or paddle lead ECG controlled by SEL0~2.


Input
Xo
Yo
Control IC352 (IO)
5V
0
20μS
Modulated Out
IC352
X
Y
Demodulated Out
ECG ×5

Paddle Contact Impedance Detection (TEC-7200/7300)


TO PADDLE
PEC A
PEC S
C381
0.22μF
T381
C382
0.22μF
EA
VPC
R382
1K
R381
20.2KF
R383
15KF
+6V
-6V
D382
D381
IC381 ½
HA17082
C384
0.047μ
IC380
4053B
C383
1μ
R380
470 Ω
REF (+4.0V)
VR381
500K
PC ZERO
R386
470K
C385
0.033μ
R385
200KF
TP381
R384
10KF
PCAD
TO A/D CONV
μPD7004C
CH2
IC381 ½
HA17082
PC REF (50kHz)
From ECG CPU
p 26

Applying a square waveform of 50kHz to the paddle, the paddle contact impedance is detected by measuring the current. The paddle circuit is isolated from the excitor / detector circuit by T381 for safety.

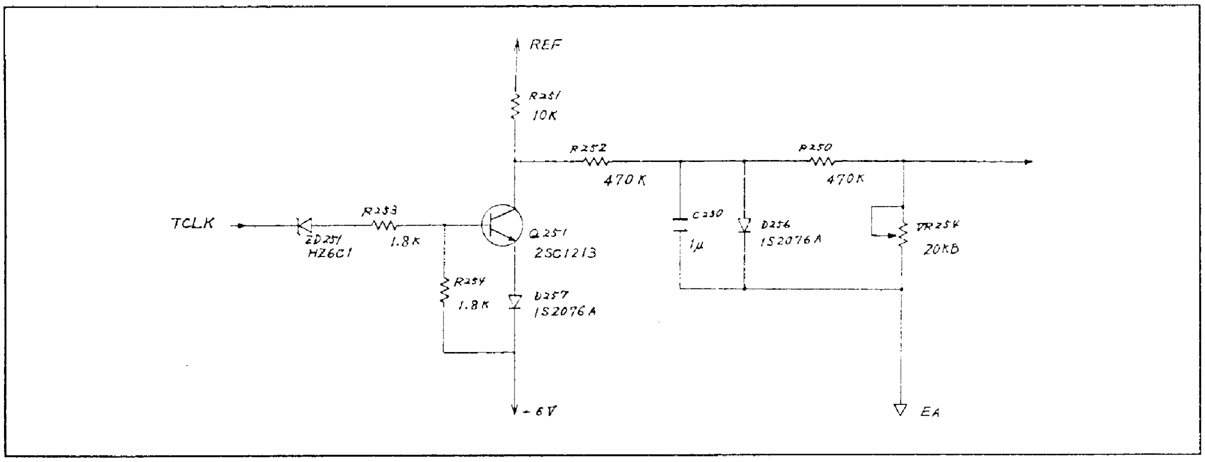
A reference voltage of 4.0V supplied by IC255-1 is switched by multiplexer IC380 to provide the square waveform at X (14). The voltage of the square signal is divided by R381 and the impedance Z. Detected voltage Vpc sent to IC381-1 with a gain of 15 times is expressed :

$$V_{pc} = 4.0 \times Z/(R381 + Z)$$

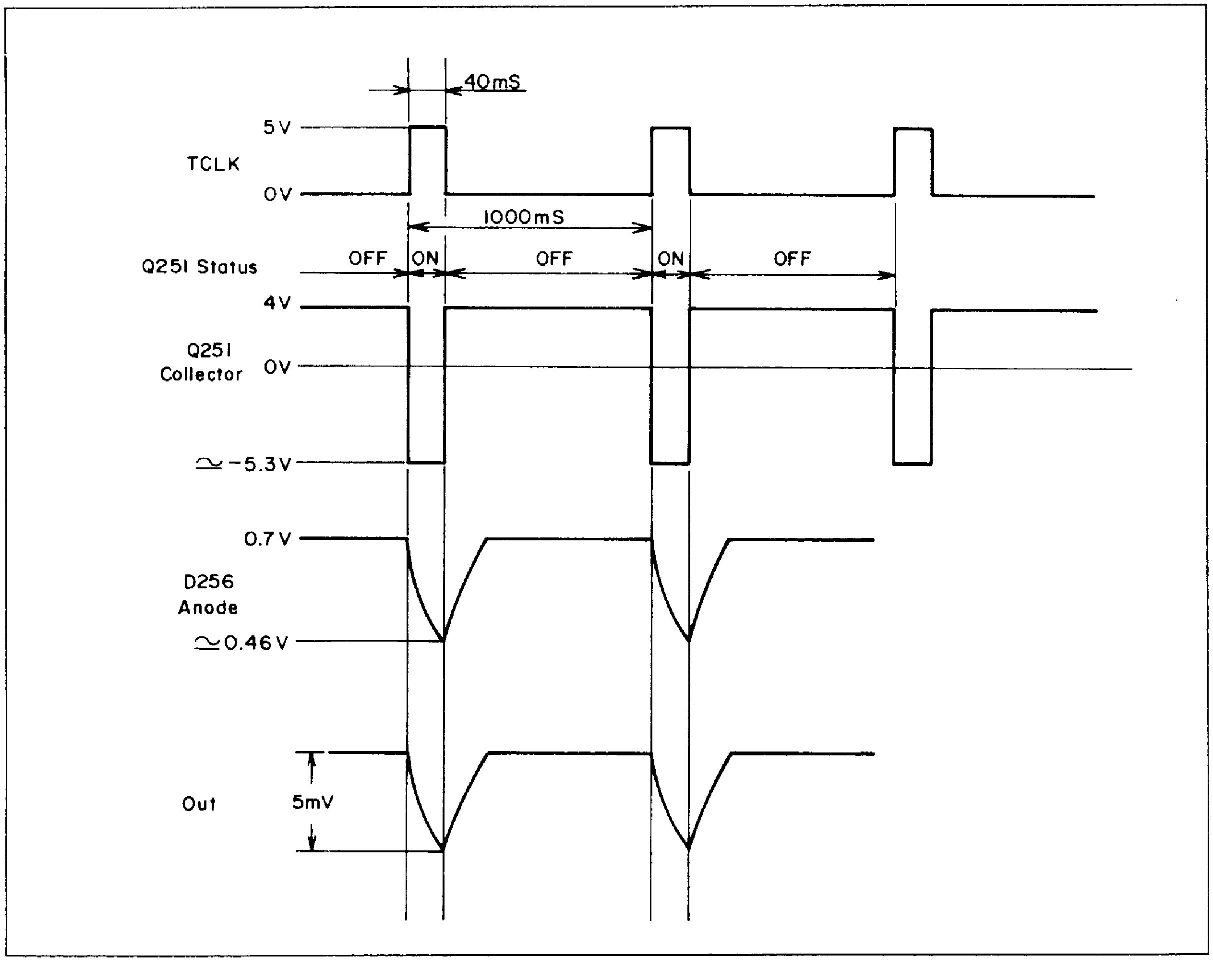
where Z : Impedance of paddle contact, T381, C381~382

D381~382 protects IC381-1 from an excessive voltage caused by turning on of the external discharge relay when discharged without load. C384 cuts offset voltage. Offset voltage is added to IC381-2 through VR381 and R386 to obtain only paddle contact impedance from Z. IC381-2 smoothes the input and sends it to the A/D converter IC202. Paddle contact indicators on the paddle light in accordance with this value.

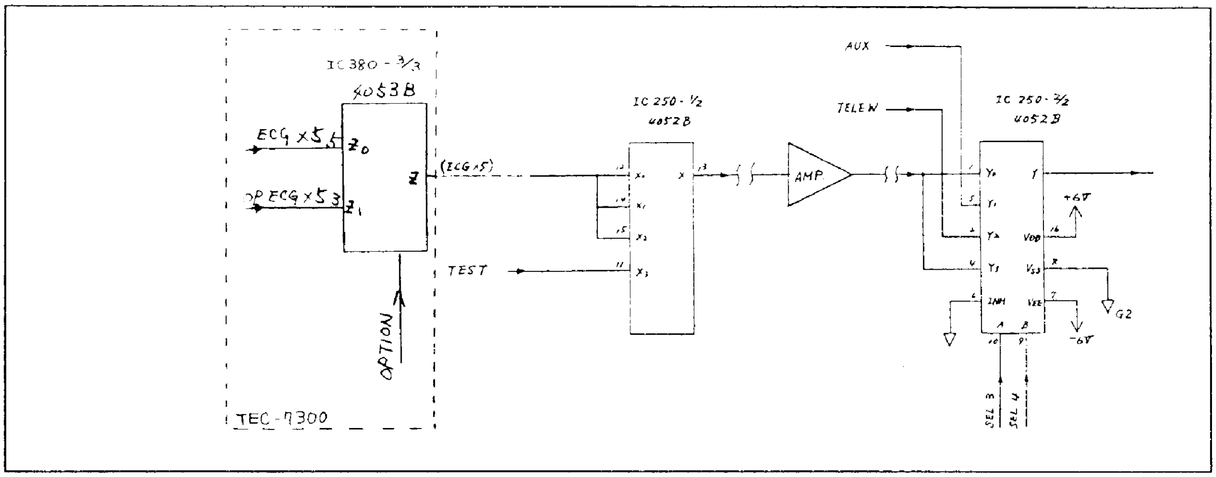
Test Waveform Generator


REF
R251
10K
R252
470K
R250
470K
TCLK
ZD251
HZ6C1
R253
1.8K
Q251
2SC1213
C250
1μ
D256
1S2076A
VR254
20KB
R254
1.8K
D257
1S2076A
-6V
EA

Charge and discharge of C250 controlled by TCLK generates the ECG simulated test waveform. The output voltage is adjusted to 5mVp-p with VR254.



Input Selector

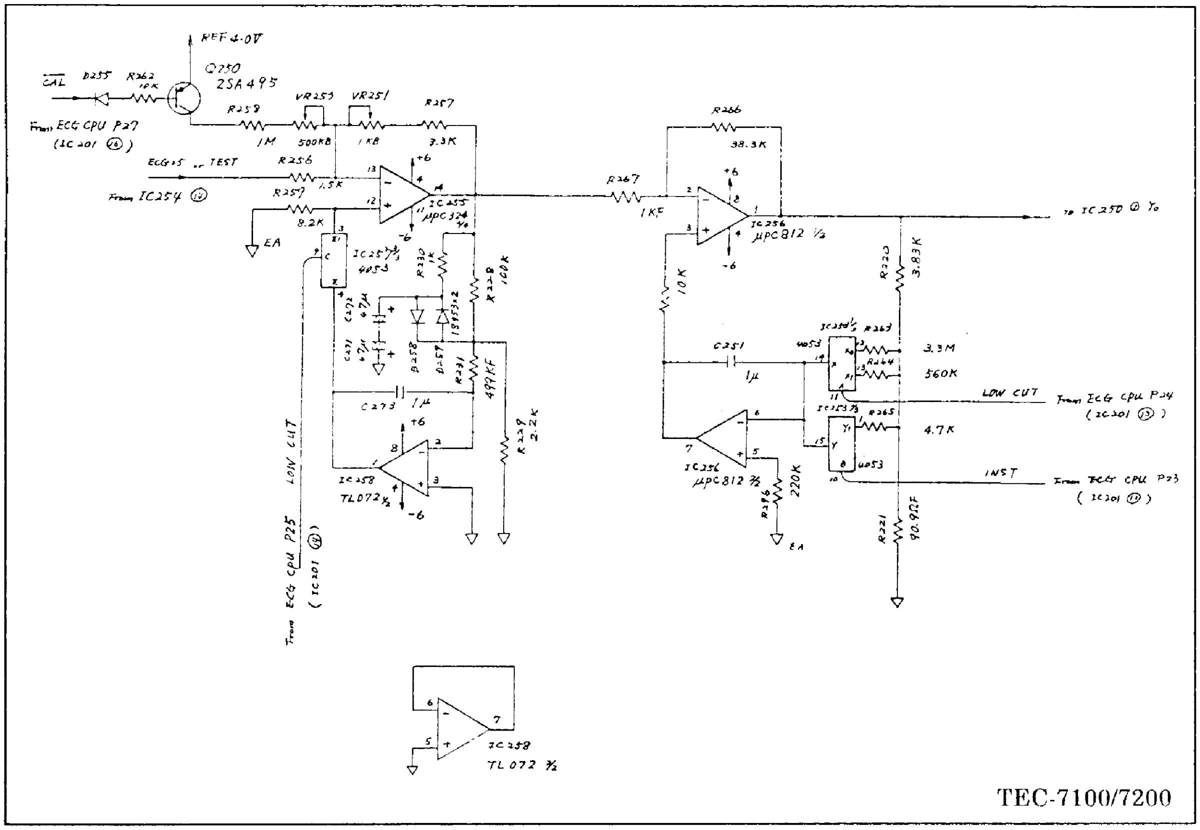

IC380 - 3/3
4053B
ECG x5
OP ECG x5
Z0
Z1
Z
OPTION
TEC-7300
(ECG x5)
TEST
IC 250 - 1/2
4052B
X0
X1
X2
X3
X
AMP
AUX
TELEW
IC 250 - 2/2
4052B
Y0
Y1
Y2
Y3
Y
INH
VDD
VSS
VEE
A
B
+6V
-6V
G2
SEL 3
SEL 4

IC250-1 selects the ECG or test waveform and IC250-2 selects one from ECG/test, auxiliary and telemeter input. The circuit between the two input selectors is described later. The relationship between control signals and outputs is shown below.

Input Selection IC250

Select	Z	Select		X	Y	Output
OPTION		SEL3	SEL4			
0	Z_0	0	0	X_0	Y_0	ECG
0	Z_0	0	1	X_2	Y_2	TELE
0	Z_0	1	0	X_1	Y_1	AUX
0	Z_0	1	1	X_3	Y_3	TEST
1	Z_1	0	0	X_0	Y_0	OPTION

Baseline Restorer, Time Constant and INST Control


REF 4.0V
CAL
D255
R262
10K
Q250
2SA495
From ECG CPU P27
(IC201 ㉖)
R258
1M
VR253
500KB
VR251
1KB
R257
3.3K
ECG×5 or TEST
R256
1.5K
From IC254 ⑭
R257
8.2K
EA
IC255
μPC324 ¼
+6
-6
IC257⅓
4053
R230
1K
R228
100K
C272
47μ
C271
47μ
D258
D257
1SS53×2
R231
499KF
C273
1μ
R229
2.2K
IC258
TL072½
LOW CUT
From ECG CPU P25
(IC201 ⑭)
R267
1KF
R266
38.3K
IC256
μPC812 ½
To IC250 ① Y0
R220
3.83K
10K
C251
1μ
IC253⅓
4053
R263
3.3M
R264
560K
LOW CUT
From ECG CPU P24
(IC201 ⑬)
R265
4.7K
INST
From ECG CPU P23
(IC201 ⑪)
IC256
μPC812 ½
R296
220K
R221
90.9ΩF
IC258
TL072 ½
TEC-7100/7200

Time constant selection of 0.32 and 3.2 sec. is controlled by two blocks : IC255-4, 258-1 and IC256. Both blocks are controlled by LOWCUT. Main function of IC255-4 and 258-1 is baseline restoring when energy is discharged. 3.2 sec. is selected only when the DIP switch on the side panel is set to the ECG position and the energy selector is set to the ECG/MON position. LOWCUT from the ECG CPU is high when 0.32 sec. is selected.

Baseline Restoring

This circuit quickly restores the saturated baseline due to a large polarization voltage caused by energy discharge. This circuit operates when a time constant of 0.32 sec. is selected (low level of LOWCUT turns on switch IC257-3). When the energy is discharged, the output of IC255-4 becomes much greater than usual, D258 or D259 turns on, and the gain of the high-cut filter IC258 becomes 30 times greater than usual as the output of IC255-4 is divided by R230 and R229. IC258-1 provides a large feedback to the amplifier IC255-4 to restore the baseline quickly. C271~272 do not allow a narrow pulse such as a pacing pulse to turn on D258~259.

Time Constant Selection

(1) Time constant of 3.2 sec.

As low level of LOWCUT turns off IC257-3 to disconnect the feedback amplifier IC258-1, IC255-4 functions only as an inverting amplifier. The output of IC256-1 is sent to the high-cut filter IC256-2 through R263 to feedback low frequency components.

(2) Time constant of 0.32 sec.

As a high level of LOWCUT turns on IC257-3, the time constant is determined by both blocks. Usually the output of the IC255-4 is several mV to several tens mV. As this level does not turn on D258~259, the input divided by R228 and R229 is sent to IC258-1. R230, D258~259 and C271~272 do not function. The output of IC256-1 is sent to the high-cut filter IC256-2 through R264.

INST Control

When the INST from the ECG CPU becomes high, switch IC253-2 turns on and R265 is selected to permit an extremely short time constant to reset the baseline. In the TEC-7300, switch IC257-2/3 also turns on to reset the baseline for the time constant control circuit of the previous stage.

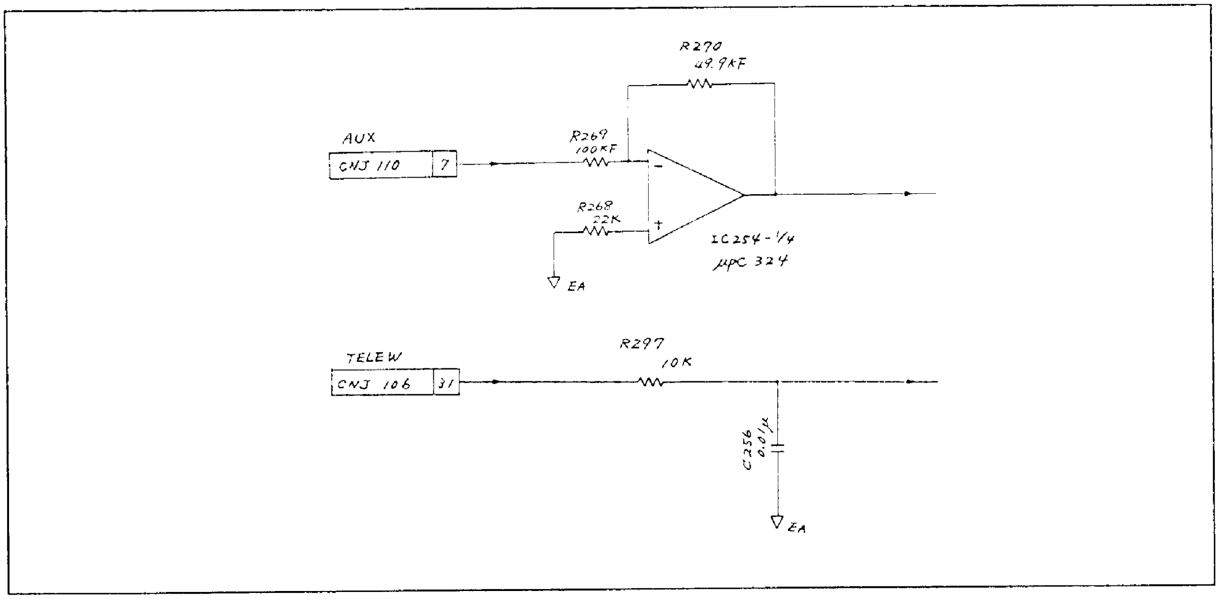
Calibration Waveform Superimpose

When the CAL from the ECG CPU becomes low, Q250 turns on to add the calibration to IC255-4.

Total Gain

The total gain of these circuits is adjusted with VR251 to 100 ($= (R257 + VR251) / R256 \times R266/R267$).

External Inputs


R270
49.9KF
AUX
CNJ 110
7
R269
100KF
-
R268
22K
+
IC254-1/4
μPC 324
EA
TELEW
CNJ 106
31
R297
10K
C256
0.01μ
EA

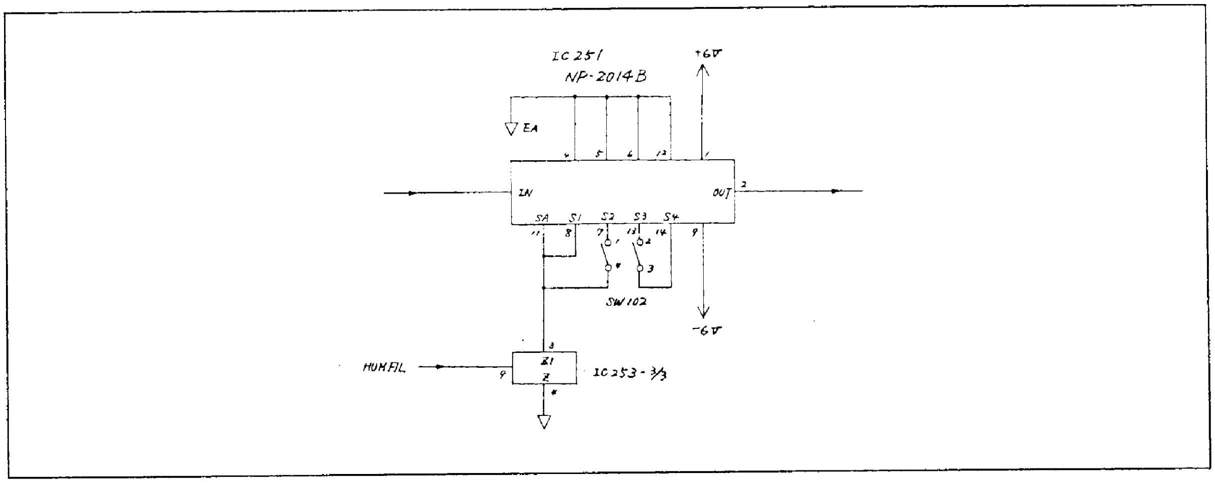
AUX

Auxiliary input of 1Vp-p is output as 1Vp-p at a sensitivity of × 1. The gain of IC254 is 0.5.

TELEW

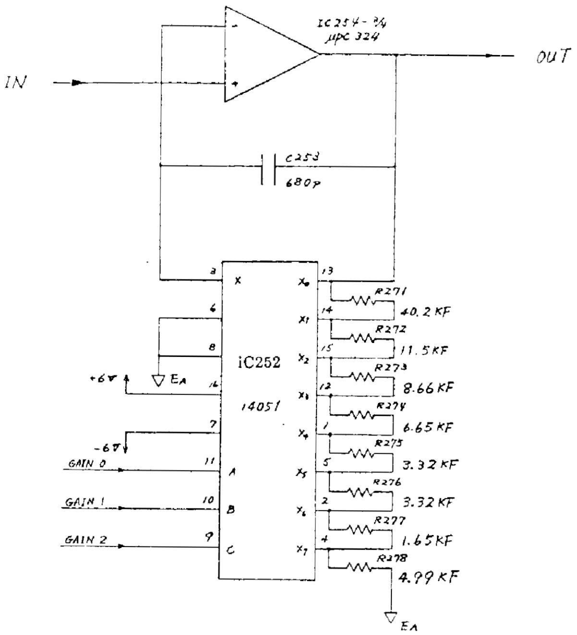
When the receiver is connected, the telemetry signal of inverted ECG of 0.5V/1mV appears as TELEW. The high-cut filter of 1.6kHz consists of R297 and C256.

AC Filter


IC 251
NP-2014B
+6V
EA
4
5
6
12
1
IN
OUT
2
SA
S1
S2
S3
S4
11
8
7
13
14
9
1
2
4
3
SW102
-6V
HUMFIL
9
3
Z1
Z
4
IC253-3/3

High level of HUMFIL turns on AC filter IC251. SW102 selects the frequency (ON: 60Hz, OFF: 50Hz).

Sensitivity Selection

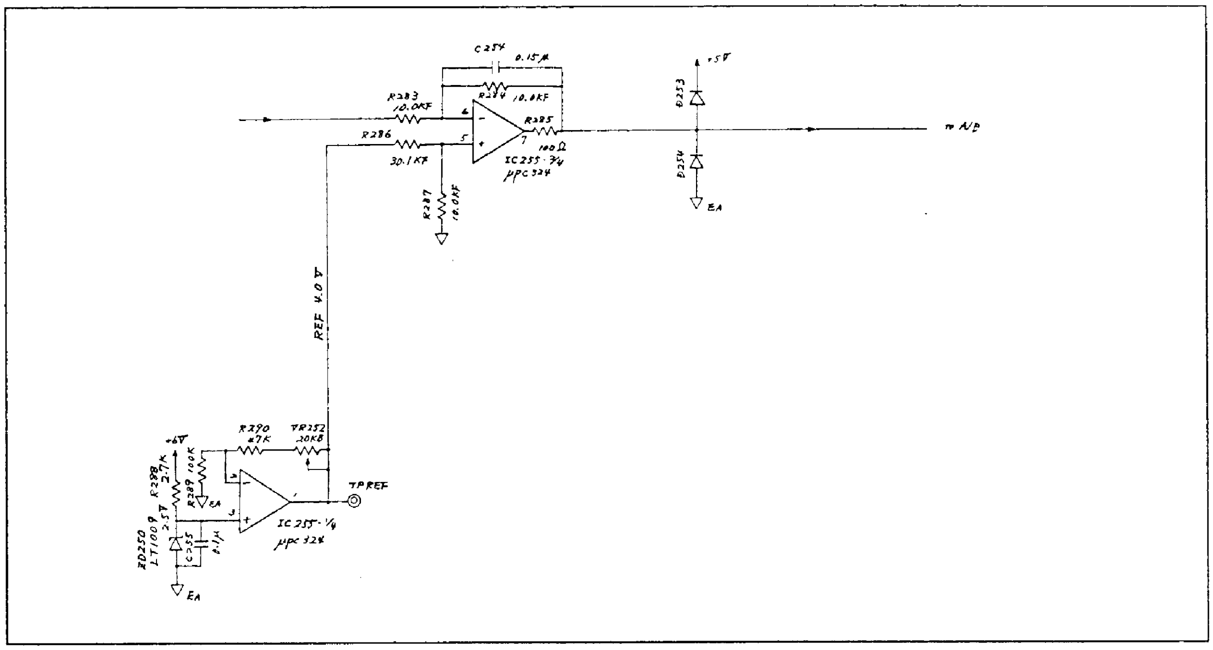

IC254-¾
μPC 324
IN
OUT
C253
680P
iC252
14051
X
A
B
C
X0
X1
X2
X3
X4
X5
X6
X7
3
6
8
16
7
11
10
9
13
14
15
12
1
5
2
4
+6V
-6V
EA
GAIN 0
GAIN 1
GAIN 2
R271
40.2 KF
R272
11.5KF
R273
8.66 KF
R274
6.65 KF
R275
3.32 KF
R276
3.32 KF
R277
1.65KF
R278
4.99 KF
EA

Sensitivity is selected by the multiplexer IC252. The input level of the selector is 0.125V/mV. Manual (×0.5, ×1, ×2, ×4) and auto selection are available.

Sensitivity Selection IC252

Total Gain (V/mV)		Control			Selection	Output Sensitivity (V/mV)
Auto	Manual	GAIN 0	GAIN 1	GAIN 2		
----	----	0	0	0	X_0	Not used
0.5	0.5	0	0	1	X_1	0.25
0.7	----	0	1	0	X_2	0.35
1	1	0	1	1	X_3	0.50
1.5	----	1	0	0	X_4	0.75
2	2	1	0	1	X_5	1.0
3	----	1	1	0	X_6	1.5
4	4	1	1	1	X_7	2.0

ECG Analog Output


C254
0.15μ
R283
10.0KF
R284 10.0KF
R285
100Ω
R286
30.1KF
6
5
7
IC255-3/4
μPC324
R287
10.0KF
D253
+5V
D254
EA
to A/D
REF 4.0V
R290
47K
VR252
20KB
+6V
R288
2.7K
R289 100K
EA
2.5V
ZD250
LT1009
C255
0.1μ
2
3
1
TPREF
IC255-1/4
μPC324
EA

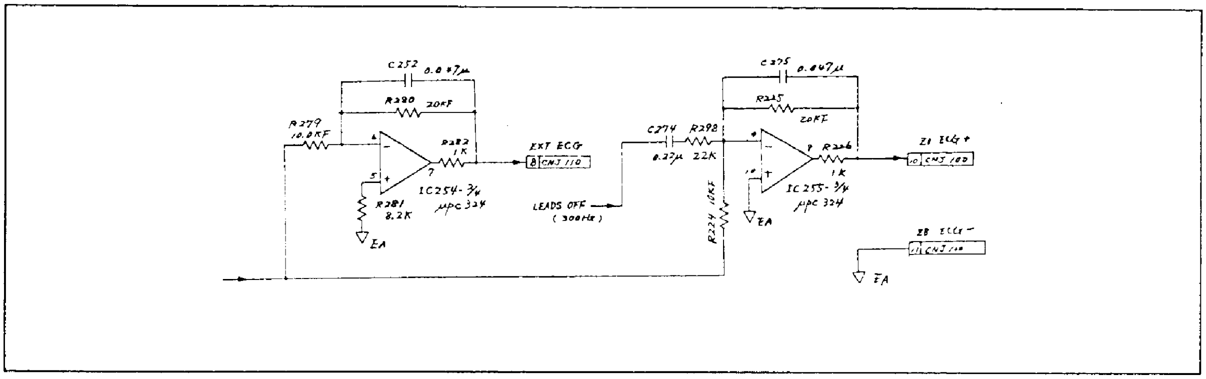
Reference Generator

IC255-1 supplies a regulated reference voltage of 4.0V. 2.5V of ZD250 is amplified by a factor of 1.6 to provide 4.0V.

High-cut Filter with Offset

IC255-2 is the high-cut filter of 100Hz with a gain of 1. The reference voltage of 4V is divided into 2V and added to IC255-2 as offset. This offset shifts the ECG signal range of $-2V \sim +2V$ to an A/D conversion range of $0 \sim +4V$.

External Outputs


C252 0.047μ
R280 20KF
R279 10.0KF
R282 1K
7
5
R281 8.2K
EA
IC254-3/4
μpc 324
EXT ECG
8 CNJ 110
LEADS OFF
(300Hz)
C274 R298
0.22μ 22K
R224 10KF
C275 0.047μ
R225 20KF
R226 1K
IC255-3/4
μpc 324
EA
Z1 ECG+
10 CNJ 100
ZB ECG−
11 CNJ 100
EA

External Output

IC254-2 is the high-cut filter of 170Hz with a gain of 2. The output level is 1V /1mV.

Telemeter Output

ZBECG signal is sent to the transmitter through the cable with attenuator for the central monitor. IC255-3 is the high-cut filter of 170Hz with a gain of 2. The output level is 1V/1mV. When leads-off is detected, a square waveform of 300Hz sent from the CRT CPU is added to IC255-3 through C274 to cut the DC component.

The ZB ECG signal attenuated to 1/1000 in the DIP SW board is outputted at the sensitivity of 1mV/1mV.

3-3-2 ECG CPU

Outline

The ECG CPU section controls :

ECG amplfier

Data transfer to / from the host CPU through the ECG CPU RAM

A/D conversion of the waveform, charge voltage, discharged energy, battery voltage, etc.

QRS detection

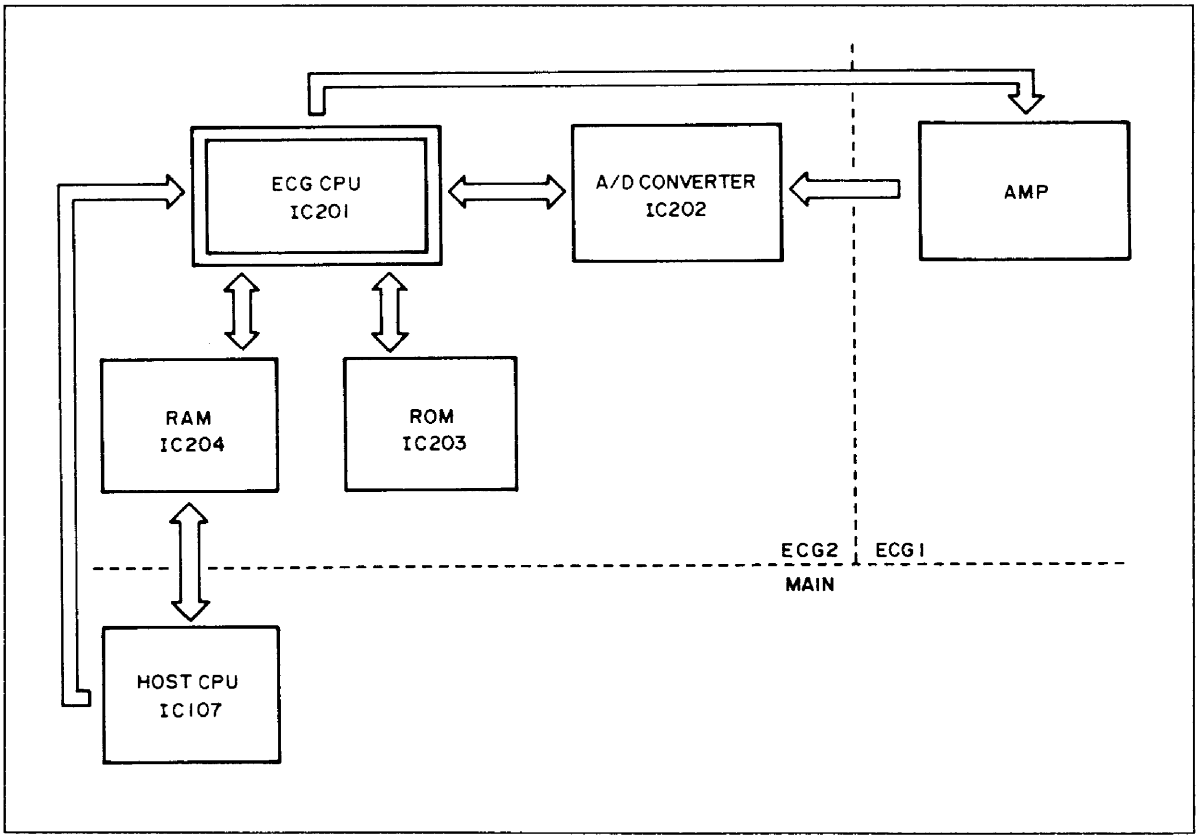
Heart rate count

VPC detection (TEC-7300 only)

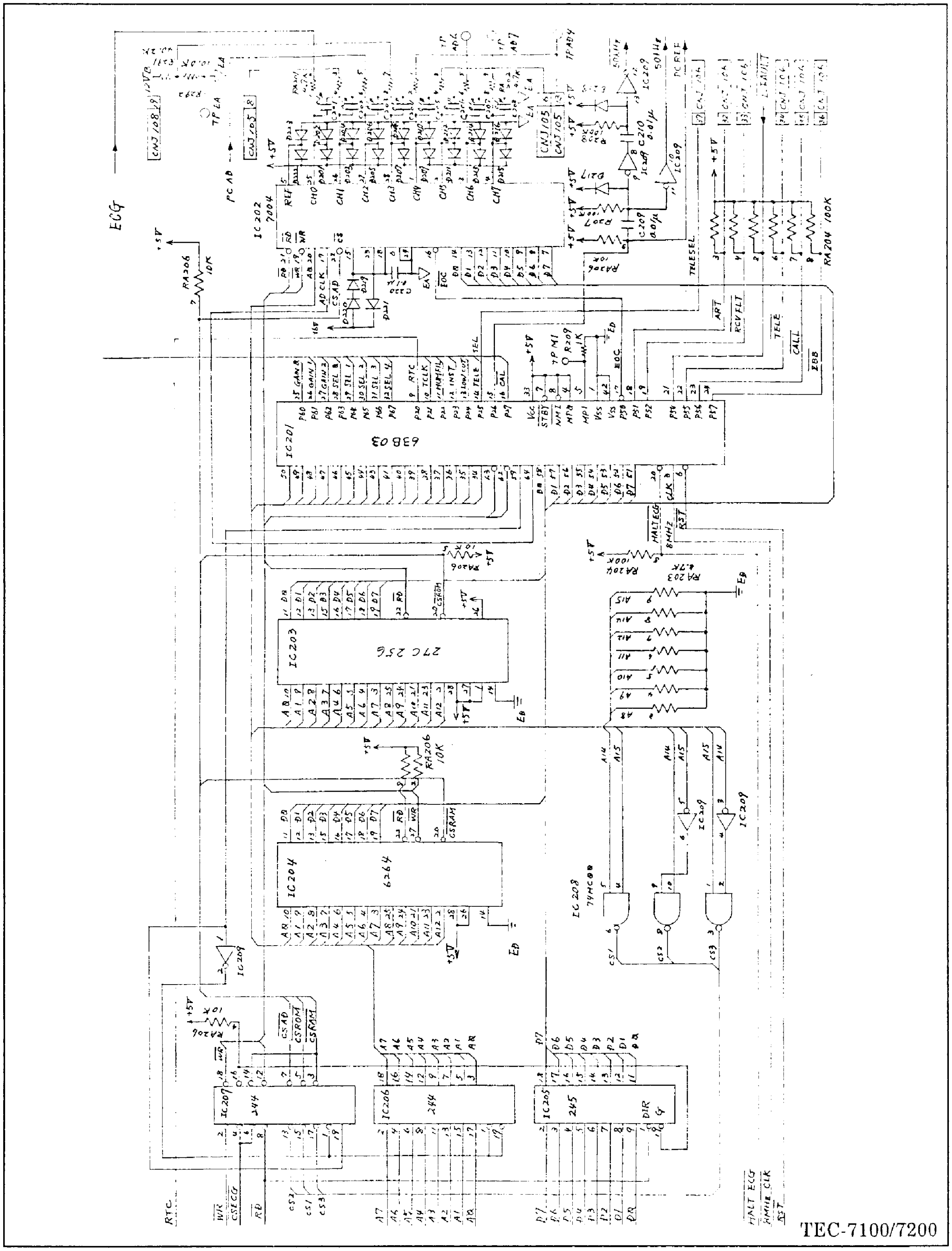
Communication with the pacing unit or interface unit (TEC-7300 only)

The ECG CPU operates on a 2MHz system clock (3MHz in TEC-7300) according to the program in the external ROM. The host CPU halts the CRT ECG every 2 msec. to transfer the data. After the data is transferred, the ECG CPU starts processing A/D converted data and the main routine.

ECG CPU and Peripheral Blocks


ECG CPU
IC201
A/D CONVERTER
IC202
AMP
RAM
IC204
ROM
IC203
ECG2
ECG1
MAIN
HOST CPU
IC107

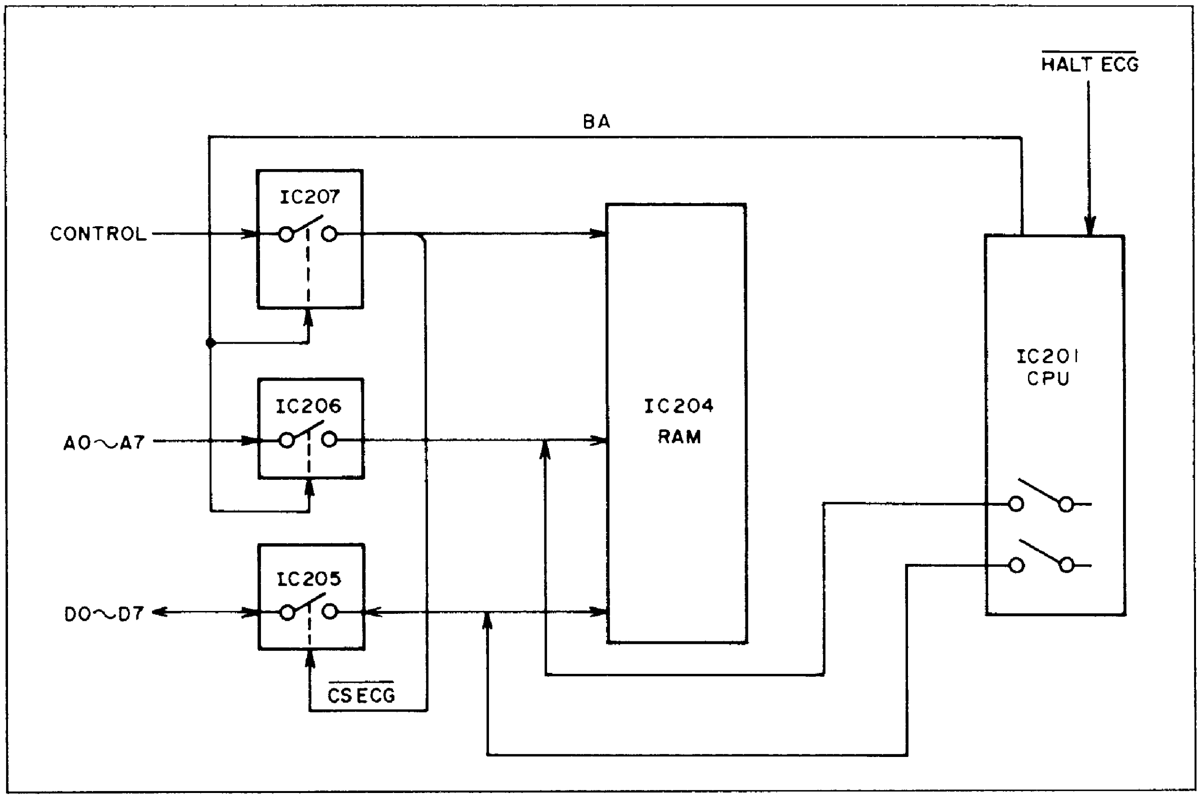
ECG CPU


ECG
IC201 63B03
IC202 7004
IC203 27C256
IC204 6264
IC205 245
IC206 244
IC207 244
IC208 74HC00
IC209
RA206 10K
RA204 100K
RA203 4.7K
CSAD
CSROM
CSRAM
HALT ECG
8MHz CLK
RST
TEC-7100/7200

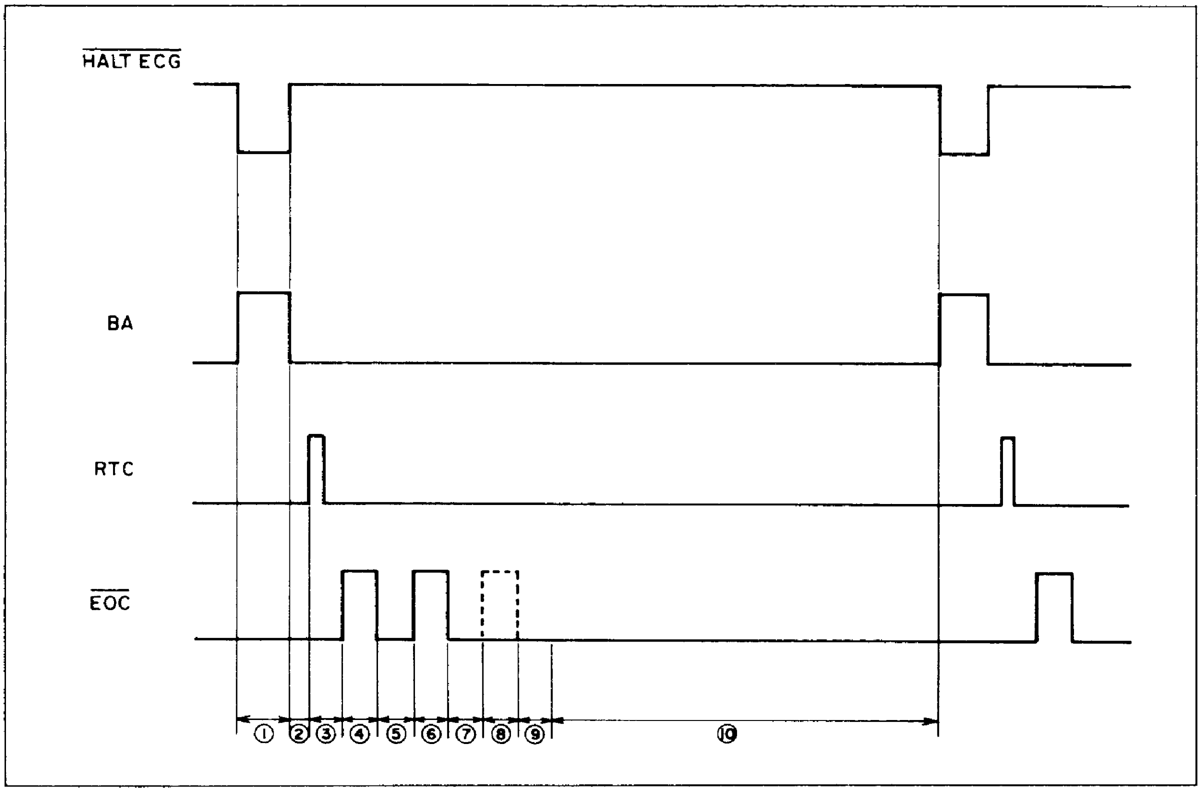
Communication with the Host CPU

Every 2 msec. the host CPU halts the ECG CPU IC201 and transfers the data to / from the ECG CPU RAM IC204. When HALTECG becomes low, the ECG CPU disconnects the bus line from itself and BA (bus available) becomes high to turn on the three-state buffer IC206~207 for the control and address bus. When the host CPU accesses the ECG RAM, CSECG becomes low to turn on the bi-directional three-state buffer IC205 for the data bus and to enable IC204 to access data. RD controls the transfer direction of the buffer.

ECG CPU Data Bus Control


HALT ECG
BA
IC207
CONTROL
IC201
CPU
IC206
IC204
RAM
A0~A7
IC205
D0~D7
CS ECG

Processing Cycle



RTC is an interrupt signal from the host CPU. During A/D conversion, the A/D converter IC202 outputs high EOC (End Of Conversion). The ECG CPU processing is shown below.

① Data is transferred from / to the host CPU to / from the ECG RAM
② Return to main routine executed before HALTECG interrupt
③ Processing for time constant, etc.
④ A/D conversion for the ECG waveform
⑤ QRS detection routine, etc.
⑥ A/D conversion for one of the following inputs :
  CH1: Charged voltage
  CH2: Paddle contact impedance
  CH3: Battery voltage
  CH4: Reference for discharged energy calculation
  Above inputs are changed every RTC in the sequence of CH1→CH2→CH1→CH3→CH1→CH2→CH1→CH4.
⑦ Processing for A/D converted data of ⑥
⑧ Main routine, or A/D conversion for TTR after CH4 is converted only when the energy is discharged.
⑨ Main routine, or calculation of discharged energy when TTR is converted.
⑩ Main routine

ECG CPU Pin Description

Pin No.	Symbol	I / O	Function
1	Vss	---	Ground (ED)
2	XTAL	---	Not used
3	EXTAL	I	Clock 8 MHz (TEC-7100/7200), 12MHz (TEC-7300)
4~5	MP0~MP1	I	Operation mode selection — Mode 1 (MP0 : 1, MP1 : 0)
6	RST	I	Reset — 0 : Resets the CPU when the power is turned on.
7	STBY	I	Not used
8	NMI	I	Not used
9	P20	I	RTC — Clock pulse of 2 msec. from the host CPU
10	P21	O	TCLK (Test clock) — Clock pulse of 100 msec. for the test waveform (See Test waveform generator section.)
11	P22	O	(TEC-7100/7200) HUMFIL (AC filter) — 1 : ON (TEC-7300) Serial communication clock
12	P23	O	(TEC-7100/7200) INST (Instantaneous trace reset) — 1 : ON (TEC-7300) Reception data of serial communication
13	P24	O	(TEC-7100/7200) LOWCUT (Time constant select) — 0 : 3.2 sec (Diagnosis), 1 : 0.32 sec (Monitor) (TEC-7300) Transmission data of serial communication
14	P25	O	(TEC-7100/7200) LOWCUT (Time constant select and ECG restorer) — 0 : 3.2 sec, restorer OFF, 1 : 0.32 sec, restorer ON (TEC-7300) Not used
15	P26	O	ECGCLK (ECG clock) — Modulation pulse of 50 kHz for ECG isolation.
16	P27	O	(TEC-7100/7200) CAL — 0 : Calibration appears. (TEC-7300) OPTION — 1 : ECG waveform is input from interface unit
17	P50	I	EOC (End of conversion) — 1 : During A / D conversion, 0 : End of A / D conversion
18	P51	I	ART (Artifact) — 0 : The electrode of a transmitter is detached.
19	P52	I	RCVFLT (Receiving fault) — 0 : A signal from a transmitter is not received.
20	P53	I	HALTECG — 0 : The host CPU halts the ECG CPU operation.
21	P54	I	LFAULT (Lead fault) — 0 : An electrode is detached.
22	P55	I	TELE (Telemeter) — 0 : The receiver is connected.
23	P56	I	CALL — 0 : Nurse call from the transmitter

Pin No.	Symbol	I / O	Function
24	P57	I	ZBB (ZB transmitter battery) — 0 : Battery level of the transmitter is low.
25~27	P60~P62	O	GAIN0~GAIN2 (Gain selection) — (See Gain Selector section.)
28~30	P63~P65	O	SEL1~SEL2 (Lead selection) — (See Lead Selector section.)
31~32	P66~P67	O	SEL3~SEL4 (Input selection) — (See Input Selector section.)
33	Vcc	I	Power — + 5 V
34~41	A15~A8	O	Address bus
42	Vss	---	Ground (ED)
43~50	A7~A0	I / O	Address bus
51~58	D7~D0	O	Data bus
59	BA	O	Bus available — 1 : The ECG CPU disconnects the bus when the ECG CPU halts.
60	LIR	---	Not used
61	R / W	---	Not used
62	WR	O	Write — 0 : Writes the data into the peripheral devices.
63	RD	O	Read — 0 : Reads the data from the peripheral devices.
64	E	O	ADCLK (A/D conversion clock) — 2 MHz (TEC-7100/7200) 3 MHz (TEC-7300)

3-3-3 HOST CPU (Main Section with UP-7638 Front Panel Board)

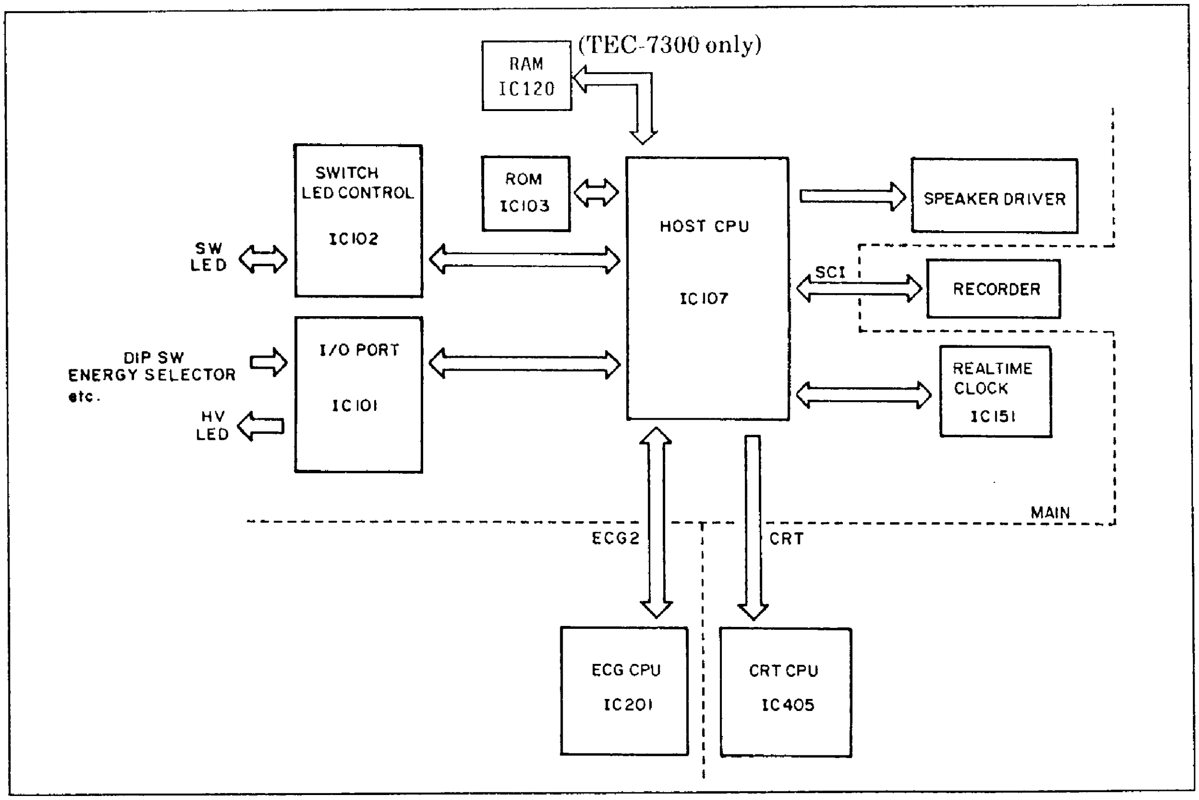
Outline

The host CPU section controls :

- Data transfer to/from ECG CPU, CRT CPU and recorder
- Key entry recognition
- LED and speaker control
- High voltage control
- Time measurement
- VPC recall waveform control (TEC-7300)

The host CPU operates on 2MHz (3MHz in TEC-7300) system clock according to the program in the ROM. The host CPU halts the ECG CPU every 2 msec. and the CRT CPU every 24 msec., and sends serial data directly to the recorder. Keyboard/display inter-face monitors key entry and controls the LED display. I/O port reads DIP switch status data and controls the high voltage unit. If the host CPU runs away, the regularly generated pulse is lost and the CPU is reset by the runaway detector.

Host CPU and Peripheral Blocks


RAM
IC120
(TEC-7300 only)
SWITCH
LED CONTROL
IC102
ROM
IC103
HOST CPU
IC107
SPEAKER DRIVER
SW
LED
SCI
RECORDER
DIP SW
ENERGY SELECTOR
etc.
I/O PORT
IC101
REALTIME
CLOCK
IC151
HV
LED
MAIN
ECG2
CRT
ECG CPU
IC201
CRT CPU
IC405

Host CPU

An 8 bit micro-processing unit 63B03X IC107 includes a 192 byte RAM, programmable timers, a serial communication interface and uses 19 line I/O ports. The crystal oscillator X100 provides a clock of 8MHz (12MHz in TEC-7300) to IC107.

Host CPU Pin Description

Pin No.	Symbol	I / O	Function
1	Vss	---	Ground
2	XTAL	---	Not used
3	EXTAL	I	Clock 8 MHz (TEC-7100/7200), 12MHz (TEC-7300)
4~5	MP0~MP1	I	Operation mode selection — Mode 1 (MP0 : 1, MP1 : 0)
6	RES	I	Reset — 0 : Resets the CPU when the power is turned on.
7	STBY	I	Not used
8	NMI	I	Non-maskable interrupt — Negative edge causes restart from start address. When RTC signal is lost by program runaway, IC106 outputs "L" NMI.
9	P20	O	QRS sync sound — 1 : ON (for 100 msec.)
10	P21	O	Charge completion sound — 1 : ON
11	P22	O	PRTCLK (Printer clock) — Clock pulse for printer
12	P23	O	Charge LED — 1 : Off or flash, 0 : Lit
13	P24	O	SIN — Serial data synchronized with clock pulse for printer
14	P25	O	Alarm sound — 1 : ON
15	P26	O	Clock — 15.4 kHz for beeps
16	P27	O	STB (Strobe) — 1 : Strobes the thermal head to latch one block data (384 bits).
17	P50	I	IRQ (Interrupt request) — 0 : Sent from Key / LED interface when a key is pressed.
18~20	P51~P53	---	Not used
21	P54	I	OVERCHG (Over charge) — 1 : Overcharge, charge is stopped.
22	P55	I	NO PAPER — 0 : Paper is used up. Absence of paper is indicated by repeated occurrence of this signal.
23	P56	O	AC — 1: AC power source, 0 : DC power source

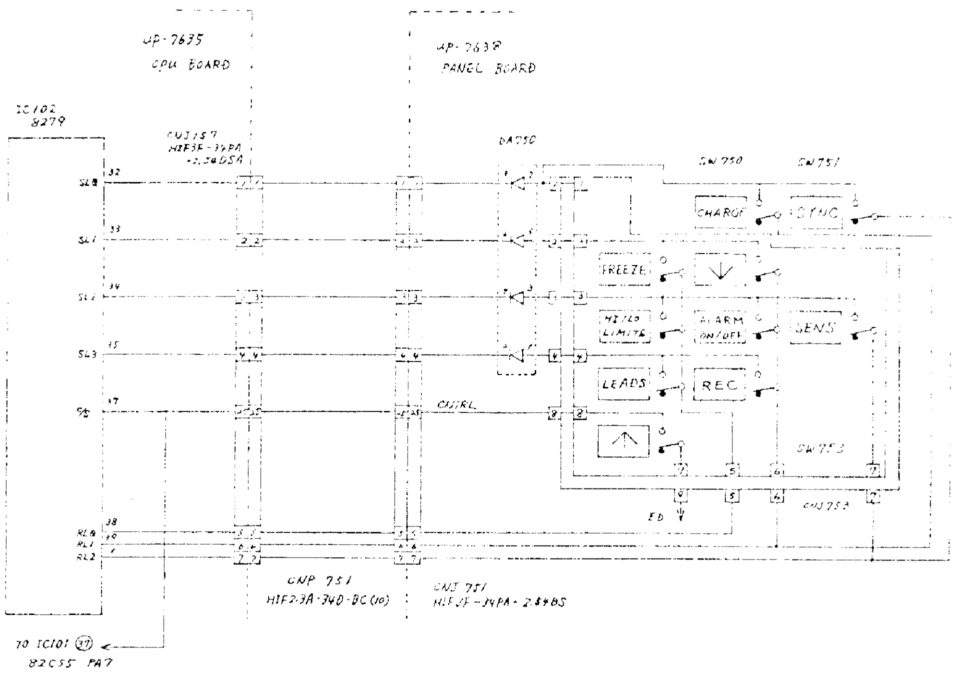
Pin No.	Symbol	I / O	Function
24	P57	O	DCHGCHK (Discharge check) — 0 : While the energy is discharged to terminals in the paddle housing for discharge test.
25	P60	O	BATTOFF — 1 : Turns off battery power source
26	P61	O	HALTCRT — 0 : Halts the CRT CPU to transfer the data to the RAM of CRT CPU
27	P62	O	RTC : Clock pulse of 2 msec.
28	P63	O	HALTECG — 0 : Halts the ECG CPU to transfer the data to / from the RAM of ECG CPU.
29	P64	O	TTRRST (TTR reset) — 1 : Resets the integrator of TTR measurement.
30	P65	---	(TEC-7100/7200) Not used (TEC-7300) DISPSEL — 0 : When the DISPLAY key is pressed.
31	P66	I	(TEC-7100/7200) Sync one time — 0 : Sync mode is released to ASYNC mode auto-matically when the energy is discharged. (TEC-7300) Not used
32	P67	---	(TEC-7100/7200) Not used (TEC-7300) Bank selection for RAM IC120
33	Vcc	I	Power — + 5 V
34~41	A15~A8	O	Address bus
42	Vss	---	Ground (ED)
43~50	A7~A0	O	Address bus
51~58	D7~D0	I / O	Data bus
59	BA	---	Not used
60	LIR	---	Not used
61	R / W	---	Not used
62	WR	O	Write — 0 : Writes the data into the peripheral devices.
63	RD	O	Read — 0 : Reads the data from the peripheral devices.
64	E	O	(TEC-7100/7200) Clock pulse of 2 MHz for the Key / LED interface. (TEC-7300) Not used

I/O Port Pin Description

Pin No.	Symbol	I / O	Function
1~4	PA3~PA0	I	Energy selector position code (See Energy Select section.)
5	RD	I	Read — 0 : The host CPU reads the data or status.
6	CS	I	Chip select — 0 : Selected
7	GND	---	Ground
8~9	A1~A0	I	Port selection (See host CPU address bus section.)
10	PC7	O	EXTRLY* (External discharge relay) — 1 : ON
11	PC6	O	INTRLY* (Internal discharage relay) — 1 : ON
12	PC5	O	CHGON* (Charge on) — 1 : Energy charging starts. * : EXTRLY, INTRLY and CHGON signals are disabled by RST for power-on transit times.
13	PC4	O	REC (Record) — 1 : Recorder starts.
14	PC0	O	LEDRED (Paddle contact red LED) — 1 : ON
15	PC1	O	LEDYEL (Paddle contact yellow LED) — 1 : ON
16	PC2	O	LEDGR (Paddle contact green LED) — 1 : ON
17	PC3	O	CLAMP (Energy charging lamp) — 1 : Lit or OFF, 0 : Flash
18	PB0	I	DIP0 = Time constant — 0 : ECG (3.2 sec.), 1 : Monitor (0.32 sec.)
19	PB1	I	DIP1 = AC filter — 0 : ON
20	PB2	I	DIP2 = Alarm recoding mode — 0 : ON
21	PB3	I	DIP3 = Automatic recording — 0 : ON
22	PB4	I	Not used
23	PB5	I	DIP5 = 3/5-electrode method — 0 : 5 electrodes (P, I , II , III , aVR, aVL, aVF, V, AUX, TELE, TEST) 1 : 3 electrodes (P, I , II , III , TEST)
24	PB6	I	DIP6 = Recording mode — 0 : Realtime , 1 : Delay
25	PB7	I	DIP7 = Paddle sync — 0 : Available
26	Vcc	I	Power — + 5V
27~34	D7~D0	I / O	Data bus
35	RST	I	Reset : Grounded to avoid reset by noise
36	WR	I	Write — 0 : The CPU writes the data or control words.
37	PA7	I	CNTL — 0 : ↑ Key is pressed.

Pin No.	Symbol	I / O	Function
38	PA6	I	EXDCHG (External paddle discharge) — 0 : Paddle discharge switches are pressed. Key / LED interface IC102 also monitors this signal to improve reliability.
39~40	PA5~PA4	I	Paddle type (PA 4, PA 5) — (0, 1) : External paddle (1, 0) : Internal paddle (1, 1) : No paddle

Key Entry (UP-7638)


UP-7635
CPU BOARD
UP-7638
PANEL BOARD
IC102
8279
CNJ157
HIF3F-34PA
-2.54DSA
DA750
SW750
SW751
SL0
SL1
SL2
SL3
32
33
34
35
37
38
39
1
RL0
RL1
RL2
CNTRL
CHARGE
SYNC
FREEZE
HI/LO
LIMITS
ALARM
ON/OFF
SENS
LEADS
REC
SW753
CNJ753
FD
CNP 751
HIF2-3A-34D-DC(10)
CNJ 751
HIF3F-34PA-2.54BS
TO IC101 (37)
82C55 PA7

TEC-7100/7200

Sheet Key on the Front Panel

Key status is sensed by key/display interface IC102. IC102 has key entry recognition and LED display control function. IC102 generates scan signal S0~S3 to the key matrix connected to UP-7638 front panel board and recognizes the key pressed by return signal R0~R2. While a key is pressed, other key entries are ignored (2-key lock-out mode). For example, when SL1 becomes low while the FREEZE key is pressed, RL0 also becomes low and IC102 recognizes key entry. Other keys are recognized as shown below.

Key Recognition by Low Level of Scan / Return Lines

	RL0	RL1	RL2
SL0	DISCHARGE	CHARGE	SYNC
SL1	FREEZE	↓ (TEC-7100/7200) SELECT (TEC-7300)	-----
SL 2	HI / LO LIMITS	ALARM ON/OFF	SENS
SL 3	LEAD	REC / STOP	-----

---- : Not used

When pressed, IRQ of IC102 (4) becomes high to request an interrupt to the host CPU IC107 (17). After IC107 reads all key data in the FIFO of IC102, IC102 clears the IRQ. The E of IC107 (64) provides the clock pulse 79CLK of 2MHz to IC102.

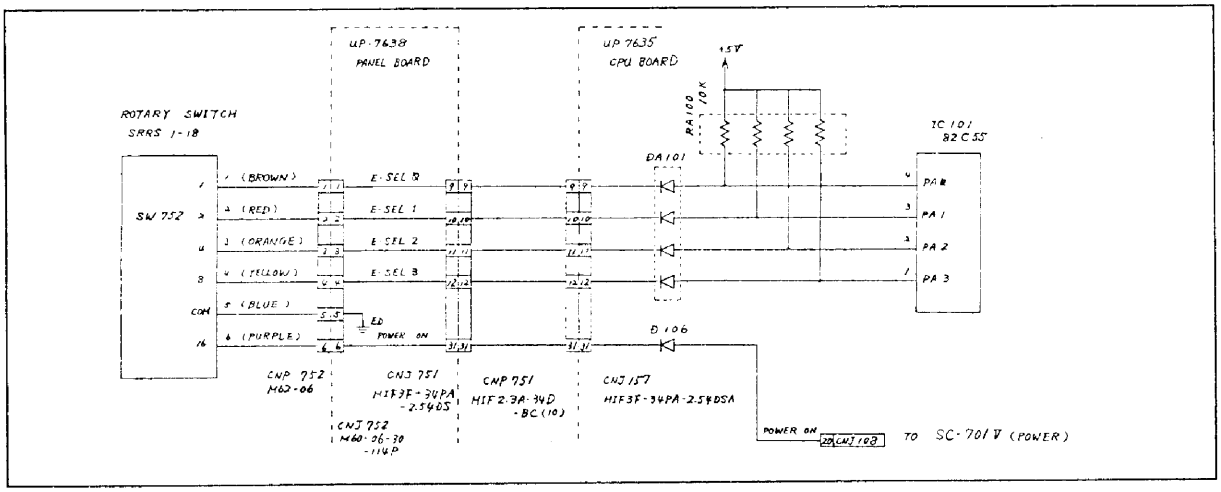
The ↑ key is the only key which is not recognized by IC102 but by the I/O port IC101 because the time setting mode requires pressing two keys (↑ and ALARM ON/OFF) at the same time. When the ↑ key and the other key are depressed, C/S of IC102 (37) becomes low and the other key pressed will select the other function.

Paddle Charge / Discharge

When the paddle charge button is pressed, EXCHG of CNJ157 (16) becomes low. If S0 also becomes low at the same time, R1 becomes low. This condition is the same as if the CHARGE key on the front panel had been pressed.

When the paddle discharge buttons are pressed, EXDICHG of CNJ157 (17) becomes low and similarly the DISCHARGE key is recognized.

Energy Selection

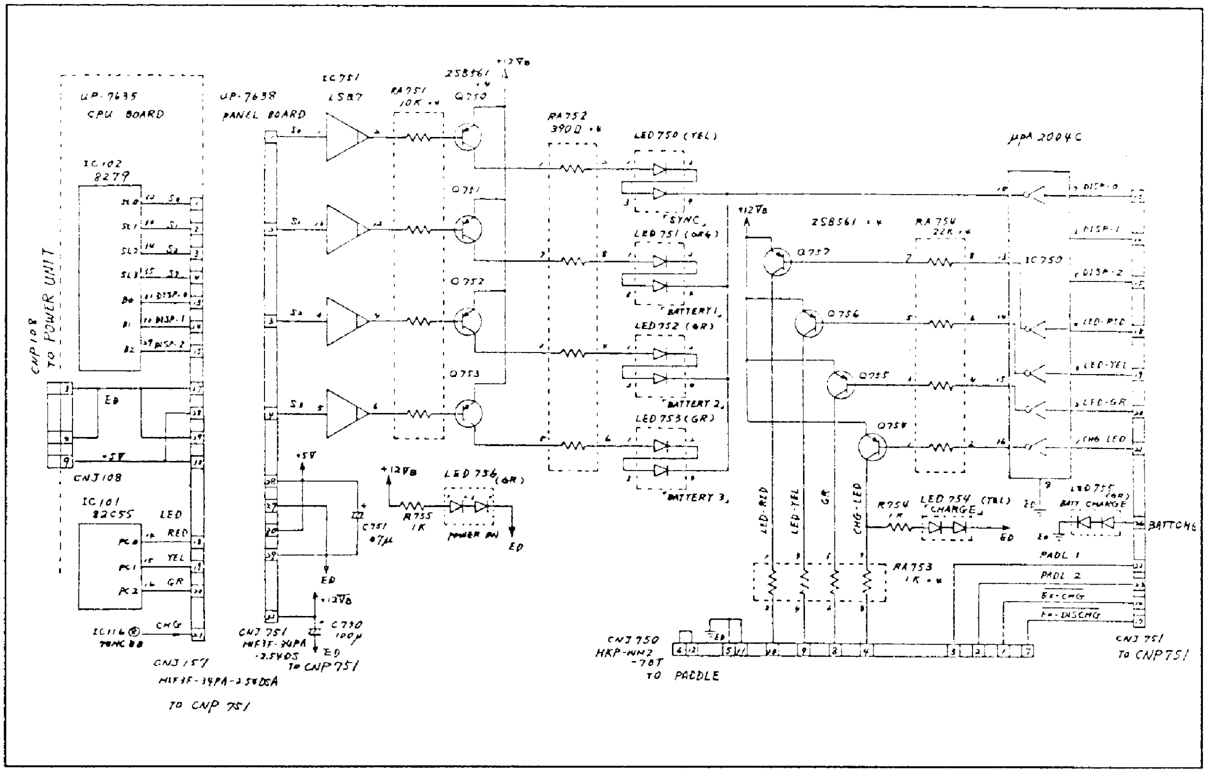

UP-7638
PANEL BOARD
UP 7635
CPU BOARD
+5V
RA100 10K
ROTARY SWITCH
SRRS 1-18
IC 101
82C55
DA101
SW 752
1 (BROWN)
2 (RED)
3 (ORANGE)
4 (YELLOW)
5 (BLUE)
6 (PURPLE)
1
2
4
8
COM
16
E-SEL 0
E-SEL 1
E-SEL 2
E-SEL 3
ED
POWER ON
D 106
PA 0
PA 1
PA 2
PA 3
CNP 752
M62-06
CNJ 751
HIF3F-34PA-2.54DS
CNP 751
HIF2.3A-34D-BC(10)
CNJ 157
HIF3F-34PA-2.54DSA
CNJ 752
M60-06-30-114P
POWER ON
20 CNJ 108
TO SC-701V (POWER)

The energy selector SW752 provides binary codes according to the set position. Energy level information ESEL0~ESEL3 is sent to the I/O port IC101. The POWER ON signal is sent to the power unit. The relationship between the selector position and codes is shown below.

Energy Selector Position and Output Code

Position	Terminal				
	1	2	3	4	6
1 (MON/ECG)	0	0	0	0	0
2 (3J)	1	0	0	0	0
3 (5J)	0	1	0	0	0
4 (10J)	1	1	0	0	0
5 (20J)	0	0	1	0	0
6 (50J)	1	0	1	0	0
7 (70J)	0	1	1	0	0
8 (100J)	1	1	1	0	0
9 (150J)	0	0	0	1	0
10 (200J)	1	0	0	1	0
11 (300J)	0	1	0	1	0
12 (360J)	1	1	0	1	0
13 (30J)	0	0	1	1	0
18 (OFF)	1	0	0	0	1

LED Display (UP-7638)


UP-7635
CPU BOARD
UP-7638
PANEL BOARD
IC102
8279
IC101
82C55
IC751
LS07
RA751
10K
2SB561
Q750
Q751
Q752
Q753
+12VB
RA752
390Ω
LED750 (YEL)
SYNC
LED751 (ORG)
BATTERY 1
LED752 (GR)
BATTERY 2
LED753 (GR)
BATTERY 3
CNP108
TO POWER UNIT
CNJ108
+5V
ED
LED
RED
YEL
GR
CHG
IC116
CNJ157
HIF3F-34PA-2.54DSA
TO CNP 751
CNJ751
HIF3F-34PA-2.54DS
TO CNP751
C751
47μ
C750
100μ
LED756 (GR)
R755
1K
POWER ON
μPA2004C
IC750
Q757
Q756
Q755
Q754
RA754
22K
DISP-0
DISP-1
DISP-2
LED-RED
LED-YEL
LED-GR
CHG LED
LED-RED
LED-YEL
GR
CHG-LED
R754
1K
LED754 (YEL)
CHARGE
LED755 (GR)
BATT CHARGE
BATTCHG
RA753
1K
PADL 1
PADL 2
EX-CHG
EX-DISCHG
CNJ750
HKP-HM2-70T
TO PADDLE
CNJ751
TO CNP751

Symbol	Color	Name	Operation
LED750	Yellow	SYNC	Lit in SYNC mode.
LED751	Orange	BATTERY 1	Depends on the battery level.
LED752	Green	BATTERY 2	Depends on the battery level.
LED753	Green	BATTERY 3	Depends on the battery level.
LED754 D050	Yellow	CHARGE	Flashes during energy charging. Lit when energy charge is completed.
LED755	Green	BATT CHG	Lit during battery charging.
LED756	Green	POWER ON	Lit while the power is on.
D051	Green	GOOD	Paddle contact impedance : ≦ 100Ω
D052	Yellow	-----	Paddle contact impedance : 100~200Ω
D053	Orange	POOR	Paddle contact impedance : ≧ 200Ω

LEDs on the front panel and the paddle are controlled by the host CPU, I/O port, key/LED interface and power unit, etc. The function of each LEDs is listed above.

SYNC and BATTERY LEDs LED750~LED753

These LEDs are controlled by scan lines S0~S3 and DISP-0 signal of the key/LED interface IC102. For example, when SL0 becomes low and DISP-0 becomes high, LED750 lights.

BATT CHG LED LED755

When the battery is charged, battery charging voltage BATTCHG is applied to LED755 through the battery detector switch.

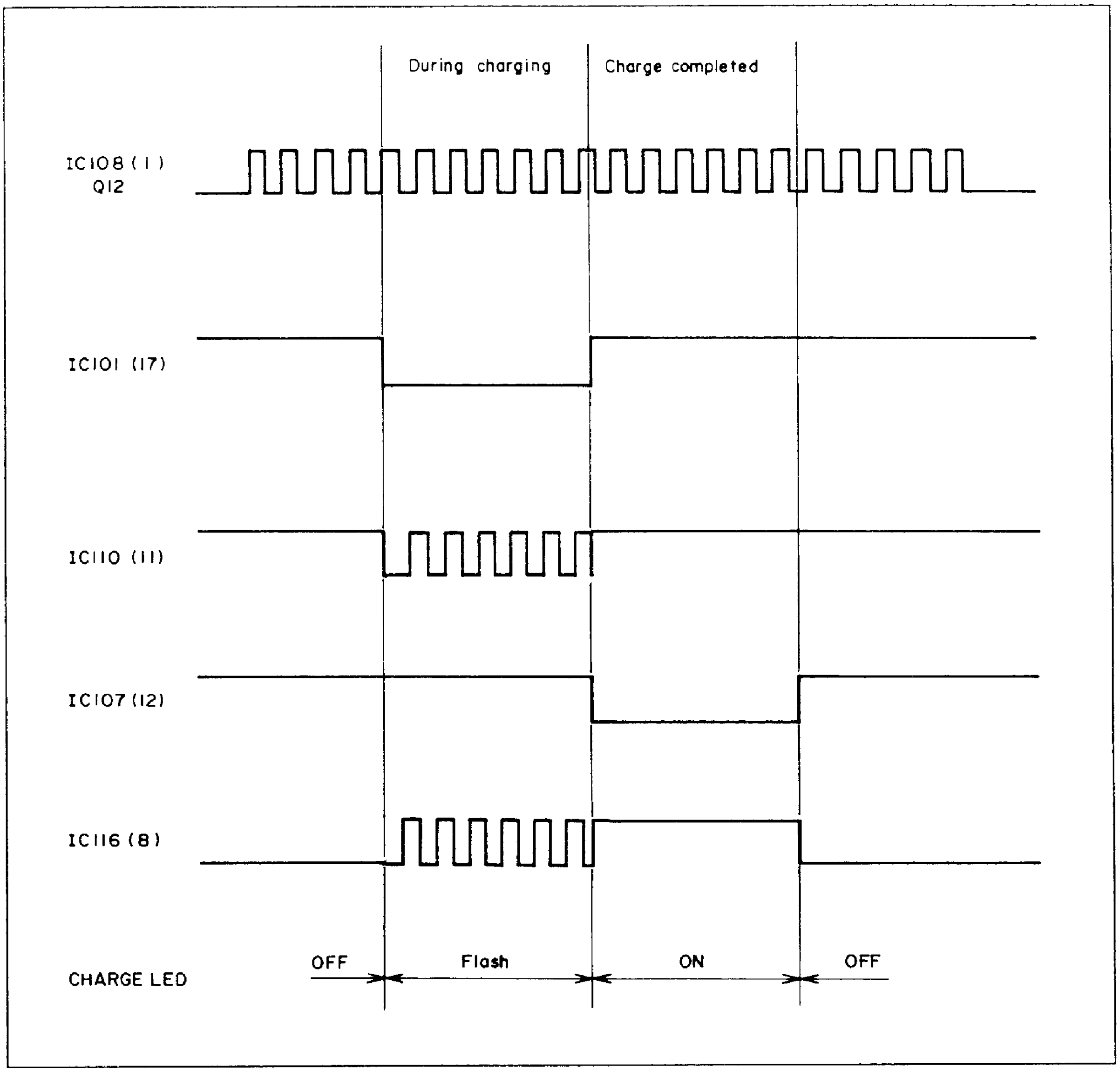
POWER ON LED LED756

When the power is turned on, +12V is supplied and the LED lights

PADDLE CONTACT LED LED051~LED053 (TEC-7200 only)

The I/O port outputs high to one of LEDRED, LEDYEL and LEDGR (IC750 ④~②) depending on the paddle contact impedance.

Charge LED Control Timing


During charging
Charge completed
IC108 (1) Q12
IC101 (17)
IC110 (11)
IC107 (12)
IC116 (8)
CHARGE LED
OFF
Flash
ON
OFF

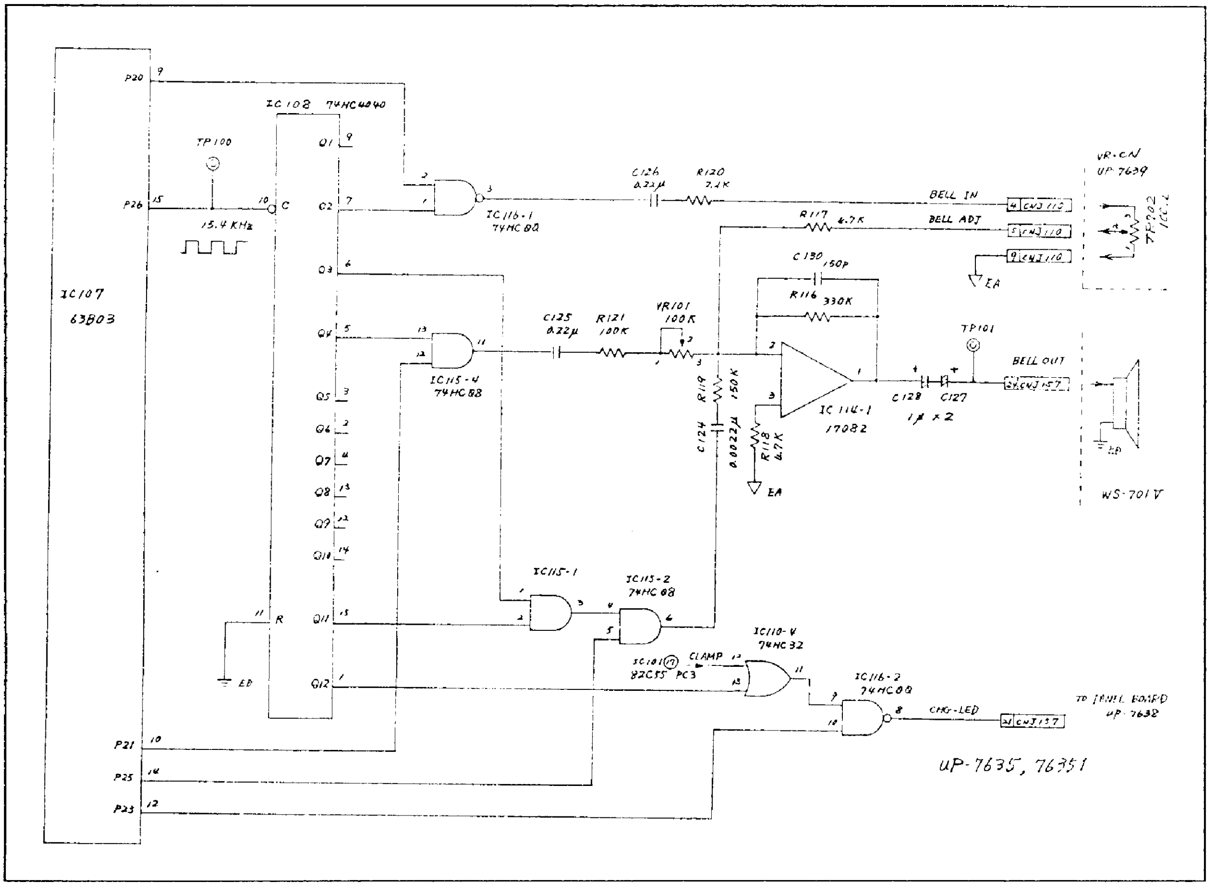
CHARGE LED LED754, LED050

(See the circuit shown in Sound Control section)
When energy charging starts, CLAMP of the I/O port IC101 (17) becomes low to enable the OR gate IC110-4 (11) to output a square waveform of 3.8Hz from the frequency divider IC108 (1). CHGLED of NAND gate IC116 (8) flashes LED754 on the front panel and LED050 on the external paddle until charging is completed. When charging is completed, P23 of the host CPU IC107 (12) outputs low, CHGLED becomes high and the LED lights steadily. When the energy is discharged, IC107 (12) becomes high and the LED goes off.

Sound Control

Charge completion, QRS sync and alarm sounds are controlled by IC107, IC108 and related gates.

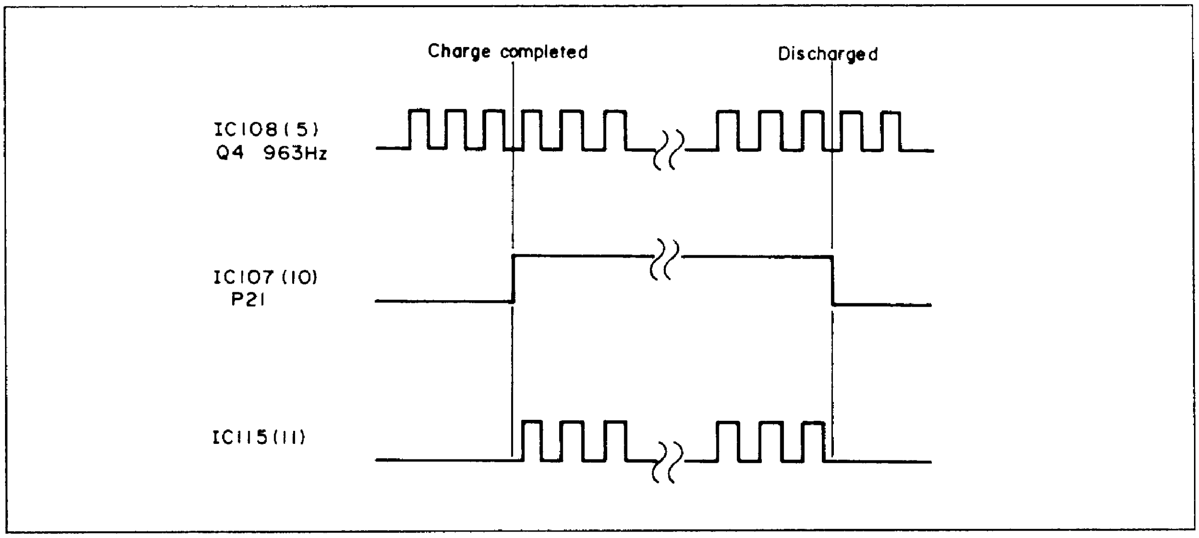
Sound and CHARGE LED control


IC107
63B03
P20
P26
P21
P25
P23
IC108 74HC4040
TP100
15.4 KHz
C
R
ED
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
IC116-1
74HC00
IC115-4
74HC08
IC115-1
IC115-2
74HC08
IC110-V
74HC32
IC101 ⑰
82C55 PC3
CLAMP
IC116-2
74HC00
CHG-LED
C126
0.22μ
R120
2.2K
BELL IN
R117 4.7K
BELL ADJ
CNJ110
EA
VR-CN
UP-7639
TP202
C130 150P
R116 330K
C125
0.22μ
R121
100K
VR101
100K
R119
150K
C124
0.0022μ
R118
4.7K
IC114-1
17082
TP101
C128
C127
1μ ×2
BELL OUT
CNJ157
WS-701V
TO PANEL BOARD
UP-7638
UP-7635, 76351

Energy Charge Completion Sound

When the energy charge is completed, P21 of IC107 (10) becomes high and a square waveform of approx. 963Hz is generated at Q4 of the frequency divider IC108 (5). A sound of 963Hz is emitted until the energy is discharged.

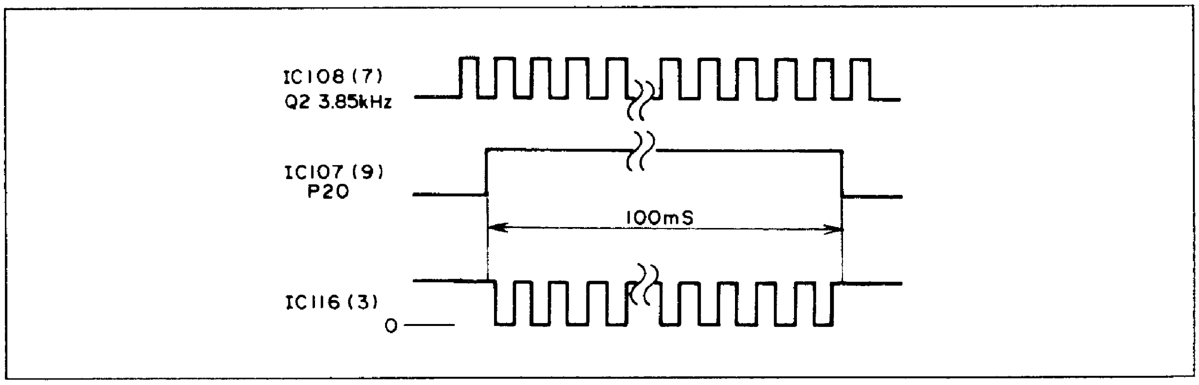
Charge Completion Sound Control Timing


Charge completed
Discharged
IC108 (5)
Q4 963Hz
IC107 (10)
P21
IC115 (11)

QRS Sync Sound

P20 of IC107 (9) becomes high in synchronization with the QRS. Q2 of IC108 (7) constantly provides a square waveform of 3.85kHz. The sound of 3.85kHz is emitted for 100 msec. in synchronization with the QRS.

Sync Control Timing


IC108 (7)
Q2 3.85kHz
IC107 (9)
P20
100mS
IC116 (3)
0

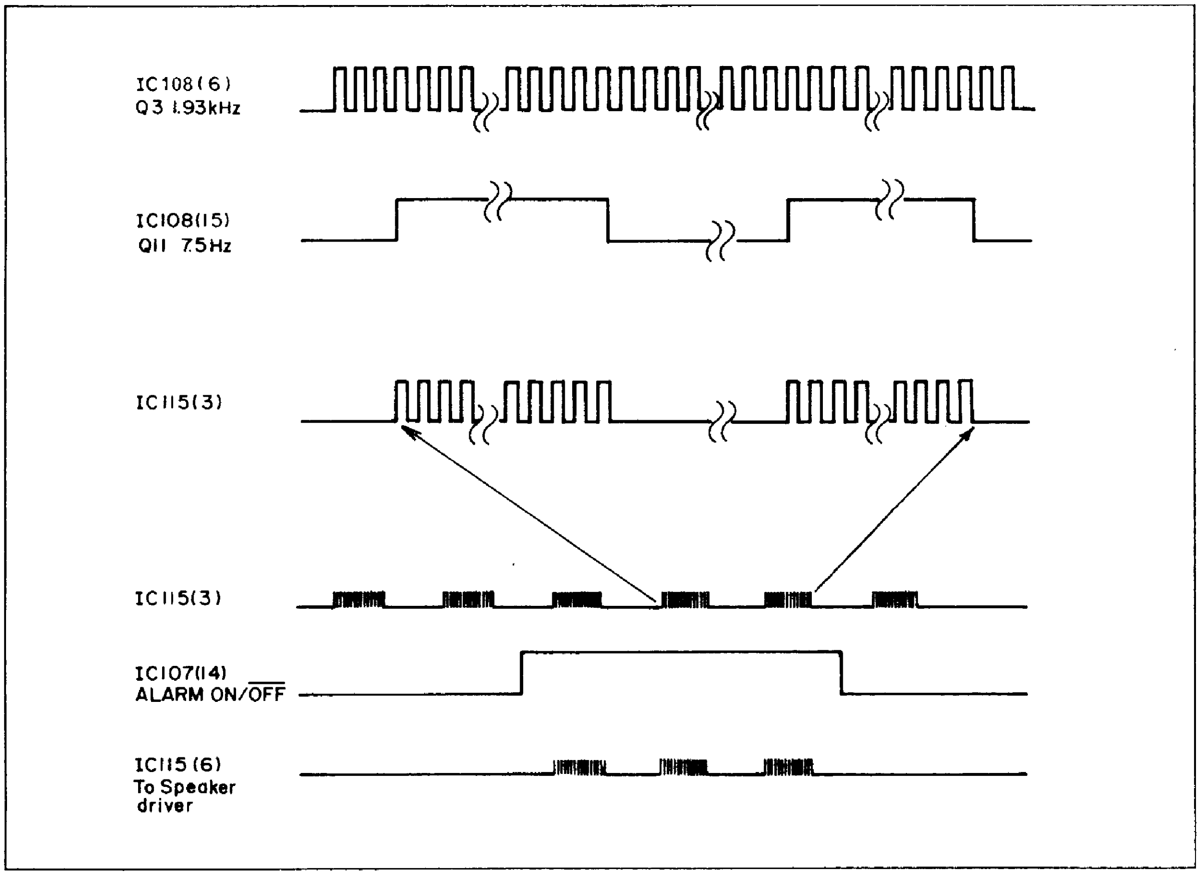
Alarm Sound

According to the cause of alarm, the alarm sounding time is determined as follows :

Sound is emitted for 3 sec.
  NG (TEST AT 50J)
  PAPER EMPTY
  ERROR 1~4
Sound continues
  LOW BATTERY
  NURSE CALL (When using a transmitter)
  SIGNAL LOSS (When using a transmitter)
  When heart rate exceeds the limits

A square waveform of 1.93kHz at Q3 of IC108 (6) and that of 7.5Hz at Q11 of IC108 (15) provides an intermittent sound. While P25 of IC107 (14) outputs high, a sound is emitted.

Alarm Sound Control Timing


IC108 (6)
Q3 1.93kHz
IC108(15)
Q11 7.5Hz
IC115(3)
IC115(3)
IC107(14)
ALARM ON/$\overline{\text{OFF}}$
IC115 (6)
To Speaker driver

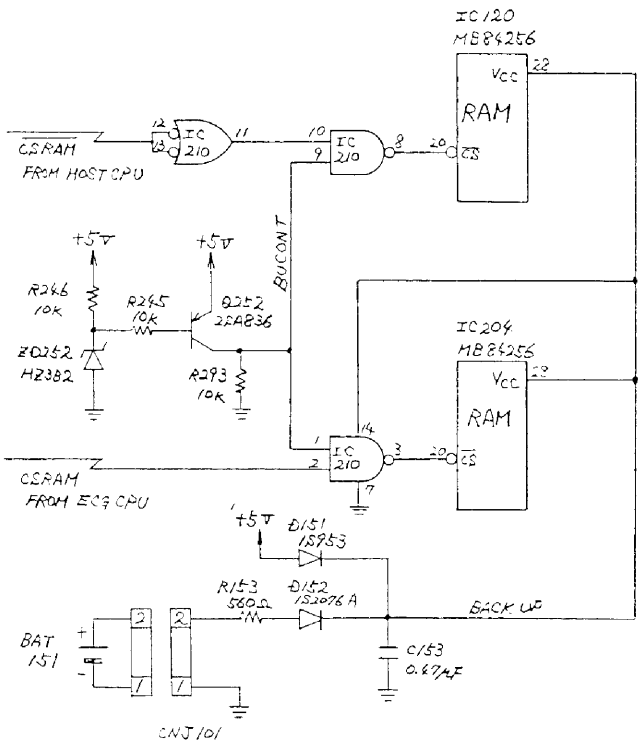
Speaker Driver

IC114-1 amplifies pulses from the above circuits to drive the speaker. C127 and C128 cut DC components of the signal. VR702 on the UP-7639 VR and a connector board adjust the sync sound volume. VR101 adjusts charge completion sound volume.

RAM Data Backup (TEC-7300 only)

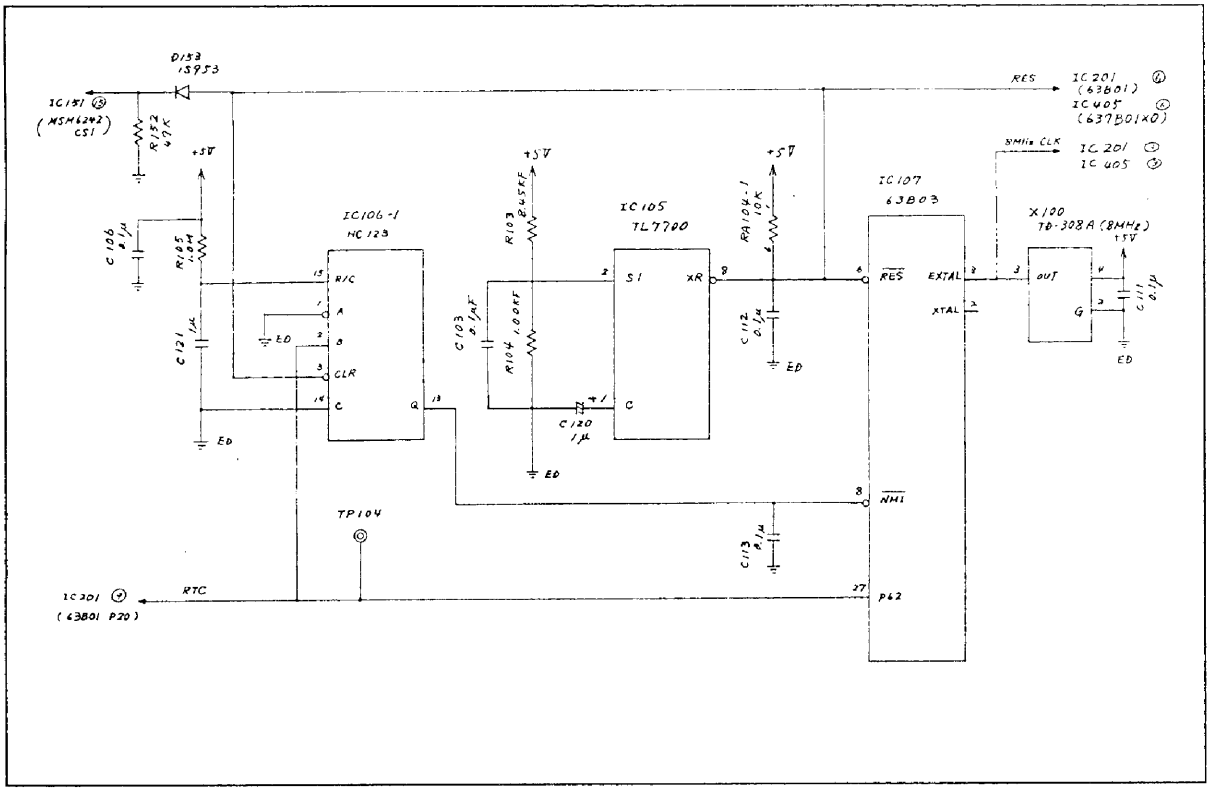
The battery BAT151 provides backup for RAMs. The higher of the two voltages of +5V and BAT151 is selected by D151 and D152. When the power is off or the supply voltage of +5V is less than approx 4V, the BUCONT signal is low and $\overline{\text{CS}}$ of the RAMs becomes high to prevent noise from appearing in the data.

RAM Data Backup


IC120
MB84256
Vcc
22
RAM
CS
20
8
10
9
IC 210
11
12
13
IC 210
CSRAM
FROM HOST CPU
BUCONT
+5V
+5V
R246
10K
R245
10k
Q252
2SA836
ZD252
HZ382
R293
10K
IC204
MB84256
Vcc
22
RAM
14
1
2
IC 210
3
7
20
CS
CSRAM
FROM ECG CPU
+5V
D151
1S953
R153
560Ω
D152
1S2076 A
BACK UP
BAT
151
+
-
2
2
1
1
C153
0.47μF
CNJ101

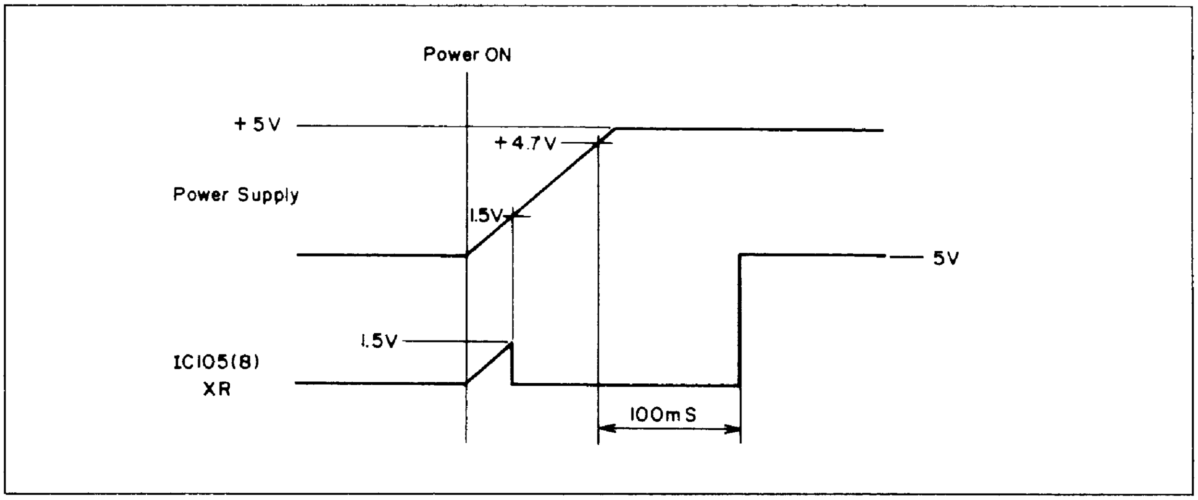
Power-on Reset

Power-on Reset and Runaway Detection


D153
1S953
IC151 ⑮
(MSM6242 CS1)
R152 47K
+5V
C106 0.1μ
R105 1.0M
C121 1μ
ED
IC106-1
HC123
15 R/C
1 A
2 B
3 CLR
14 C
Q 13
ED
+5V
R103 8.45KF
C103 0.1μF
R104 1.00KF
C120 1μ
+1
ED
IC105
TL7700
2 S1
XR 8
C
+5V
RA104-1 10K
C112 0.1μ
ED
IC107
63B03
6 RES
EXTAL 3
XTAL 2
8 NMI
27 P62
C113 0.1μ
RES
IC201 ⑥ (63B01)
IC405 ⑥ (637B01X0)
8MHz CLK
IC201 ③
IC405 ③
X100
TD-308A (8MHz)
+5V
3 OUT
4
2 G
C111 0.1μ
ED
TP104
RTC
IC201 ⑨
(63B01 P20)

The voltage monitor IC105 monitors the power supply voltage and resets CPUs until the voltage reaches a steady state when turning on the power. After the power is turned on, the voltage reaches 1.5V in transit, IC105 starts operating and XR (open collector out) of IC105 (8) turns on. RES (reset) of IC107 becomes low and IC107 is reset. XR is kept low until 100 msec. after the power supply voltage reaches 4.7V. The waiting time of 100 msec. is determined by C120 which is charged by IC105 (1). RES pulse also resets the ECG CPU IC201 and CRT CPU IC405.

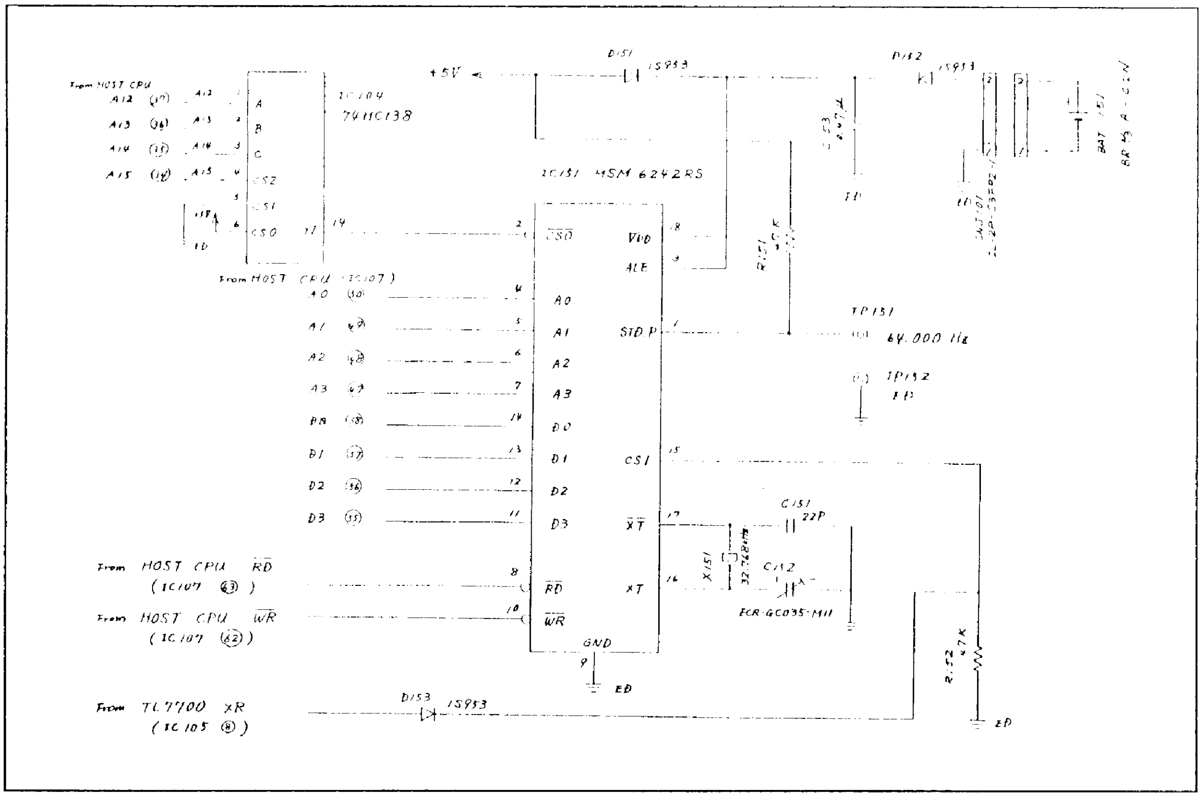
Power-on Reset Timing



Runaway Detection

IC107 (27) constantly generates a clock pulse RTC of 2 msec. Re-triggerable monostable multivibrator IC106 (13) Q outputs a pulse of 1 sec. determined by the product of C121 (1μF) and R105 (1MΩ) when a pulse is applied to B IC106 (3). While 2 msec. pulses are successively input to B, Q continuously outputs high. If IC107 runs away, the 2 msec. pulse disappears so that Q becomes low 1 sec. later and IC107 is restarted from start address.

Real-time Clock


From HOST CPU
A12 (39)
A13 (36)
A14 (35)
A15 (34)
IC104
74HC138
A
B
C
CS2
CS1
CS0
ED
From HOST CPU (IC107)
A0 (50)
A1 (49)
A2 (48)
A3 (47)
D0 (38)
D1 (37)
D2 (36)
D3 (35)
From HOST CPU RD (IC107 63)
From HOST CPU WR (IC107 62)
From TL7700 XR (IC105 8)
+5V
D151 1S953
D152 1S953
D153 1S953
IC151 MSM6242RS
CS0
VDD
ALE
STD.P
CS1
XT
GND
RD
WR
ED
C153
R151 47K
TP151
64.000 Hz
TP152
ED
C151 22P
C152
ECR-GC035-M11
X151 32.768kHz
R152 47K
BAT151
BR 2/3 A-G2N
CN101

IC151 is a real-time clock with calendar function operated on either the instrument's power supply or the lithium battery BAT151.

When the power of +5V is turned off, IC151 is powered by BAT151 of +3V (standby condition) in a state of lower power consumption. In this condition, clock function is internally available but interface with other devices is not guaranteed.

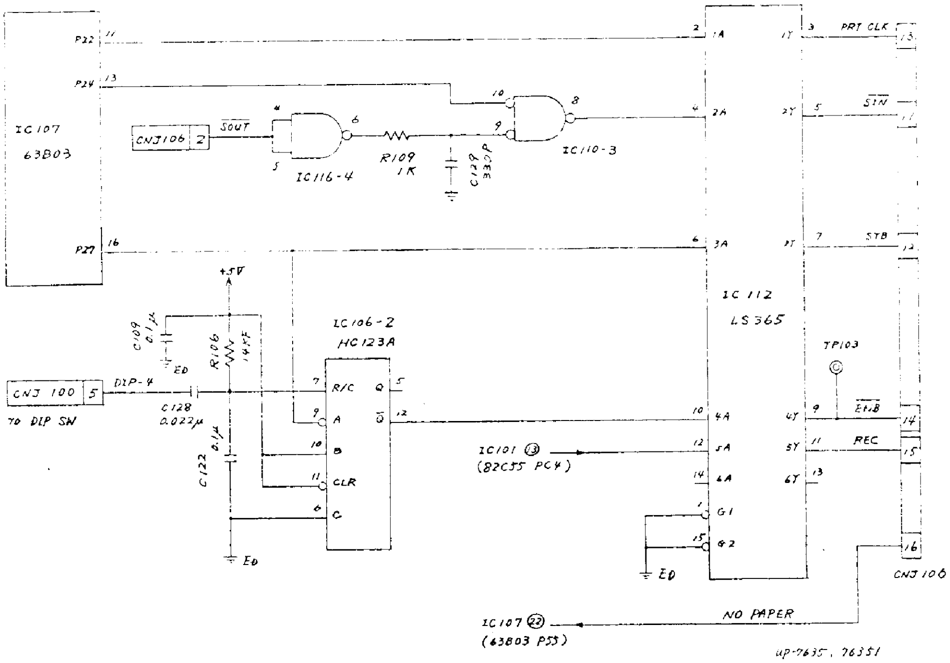
When the power is turned on, D151 turns on, D152 turns off and +5V power source is selected. In transit state to/from standby condition, CS1 (chip select) of IC151 (15) is kept low to disable to break the clock data. CS1 is controlled by the voltage monitor IC105 (See the power on reset). When VDD of IC151 becomes 4.0V and IC151 is released from standby condition as the threshold level of power supply voltage for the standby is 4.0V, CS1 becomes high and the interface becomes available 100 msec. after the power supply voltage reaches 4.7V.

The external crystal oscillator X151 provides 32.768kHz. This oscillation pulse divided into 64.000Hz at STD.P is adjusted with C152.

Low level of CS0 allows IC151 to access to external devices.

Data Transfer to Recorder

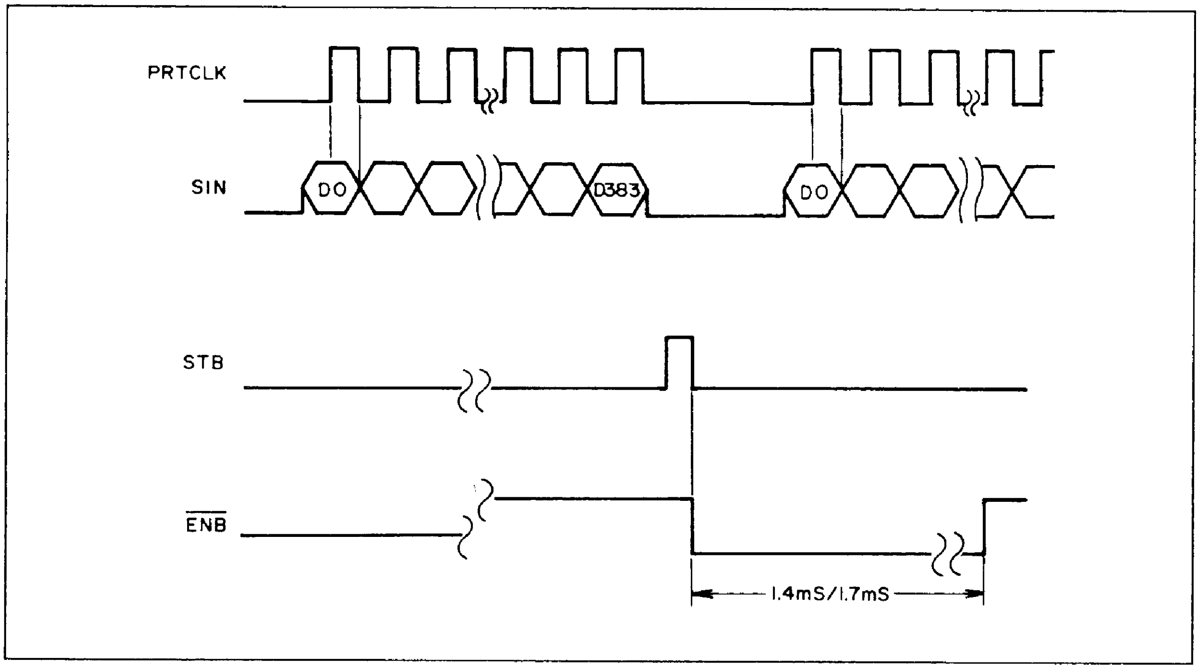
Recording Data Transfer


IC107
63B03
P22
11
P24
13
P27
16
CNJ106
2
SOUT
4
5
6
IC116-4
R109
1K
C129
330P
10
9
8
IC110-3
+5V
C109
0.1μ
ED
R106
14KF
IC106-2
HC123A
CNJ 100
5
DIP-4
TO DIP SW
C128
0.022μ
C122
0.1μ
7
R/C
Q
5
9
A
Q̄
12
10
B
11
CLR
6
C
ED
IC112
LS365
2
1A
1Y
3
PRT CLK
13
4
2A
2Y
5
SIN
11
6
3A
3Y
7
STB
12
10
4A
4Y
9
ENB
14
TP103
IC101 ⑬
(82C55 PC4)
12
5A
5Y
11
REC
15
14
6A
6Y
13
1
G1
15
G2
ED
16
CNJ106
IC107 ㉒
(63803 P55)
NO PAPER
up-7635, 76351

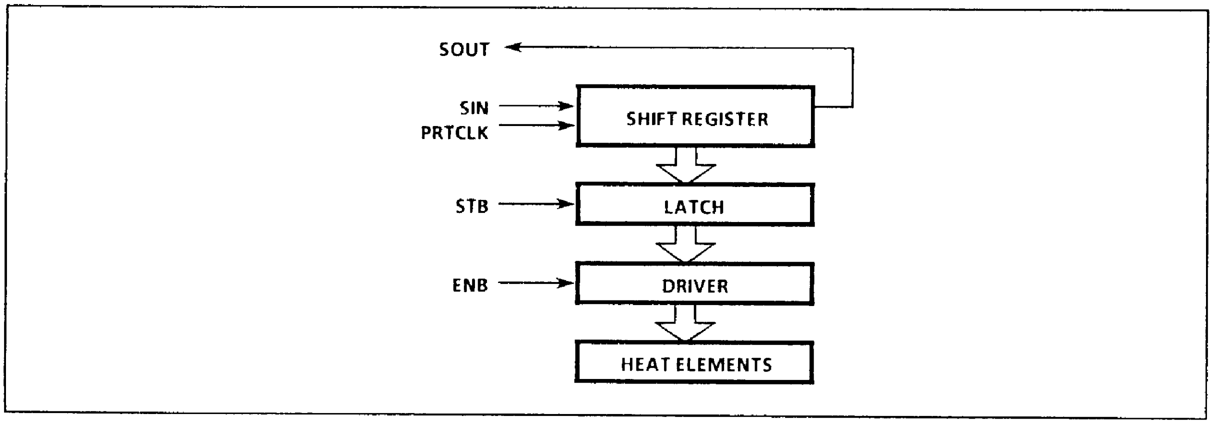
Recording data is transferred from the serial communication interface (SCI) of the host CPU IC107 to the thermal head in the recorder.

The serial data SIN is output from the SCI P24 of IC107 (13) in synchronization with the PRTCLK (printer clock). When one row line data of 384 points — 8 dots /mm × 48mm (recording width) — is output to the shift register in the thermal head for serial-to-parallel conversion, a STB (strobe) pulse appears at P27 of IC107 (16) to latch the data. Negative going edge of STB allows the monostable multivibrator IC106-2 to generate a low pulse ENB (enable) to drive heat elements. The pulse width of ENB determined by R106, C122 and C128 controls the darkness (temperature) of the recording trace. When No. 4 of the DIP switch on the side panel is set to "HIGH" (using Nihon Kohden specified paper), CNJ100 (5) is opened, C122 and R106 generates ENB of 1.4ms. When set to "PPR SENS" (using medium sensitivity paper), CNJ100 (5) is grounded, C122, C128 and R106 generates ENB of 1.7ms.

Recording Data Transfer Timing


PRTCLK
SIN
DO
D383
DO
STB
ENB
1.4mS/1.7mS

Thermal Head Block Diagram


SOUT
SIN
PRTCLK
SHIFT REGISTER
STB
LATCH
ENB
DRIVER
HEAT ELEMENTS

When the same heat element is continuously heated, excessive heating resulting in the shortening of the life of the thermal head occurs. To avoid two heatings successively, carry SOUT from the shift register controls the SIN. When a certain element has been heated in the previous cycle, SOUT becomes low to block the SIN.

3-3-4 CRT CPU

Outline

The CRT CPU section controls :

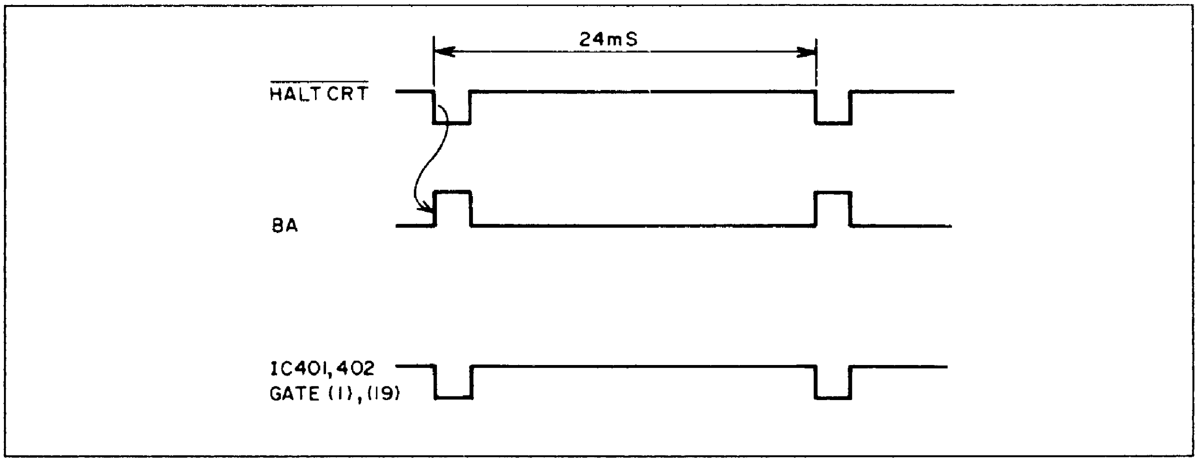
Display data transfer from the host CPU through the CRT CPU RAM
Peak-bottom processing of ECG waveform
D/A conversion of the waveform
Timing control signal generation for the CRT driver

The CRT CPU operates on 2MHz system clock according to the program in the internal ROM (TEC-7100/7200) or ROM IC413 (TEC-7300). The host CPU halts the CRT CPU every 24 msec. to transfer the data. After the data is transferred, the CRT CPU sends one frame data, the D/A converted ECG waveform of two channels for XY display mode and the serial character data for raster scan display mode, with timing control signals to the CRT driver.

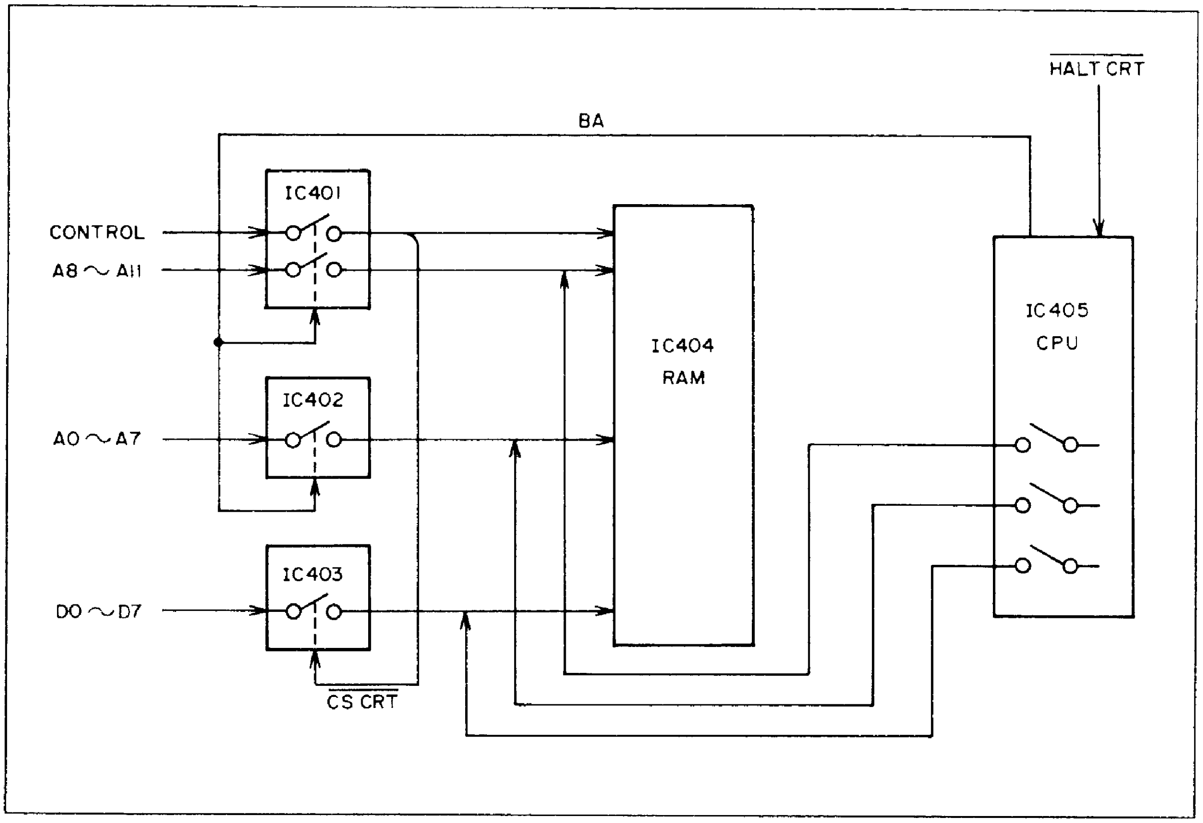
Communication with the Host CPU

Every 24 msec. the host CPU halts the CRT CPU IC405 and transfers the data to the CRT CPU RAM IC404. When HALTCRT becomes low, the CRT CPU disconnects the bus line from itself and BA (bus available) becomes high to turn on the three-state buffer IC401~402 for the control and address bus. When the host CPU writes the data to IC404, CSCRT becomes low to turn on the bi-directional three-state buffer IC403 for the data bus and to enable IC404 to access data. RD controls the transfer direction of the buffer.

CRT ECG Data Bus Control Cycle



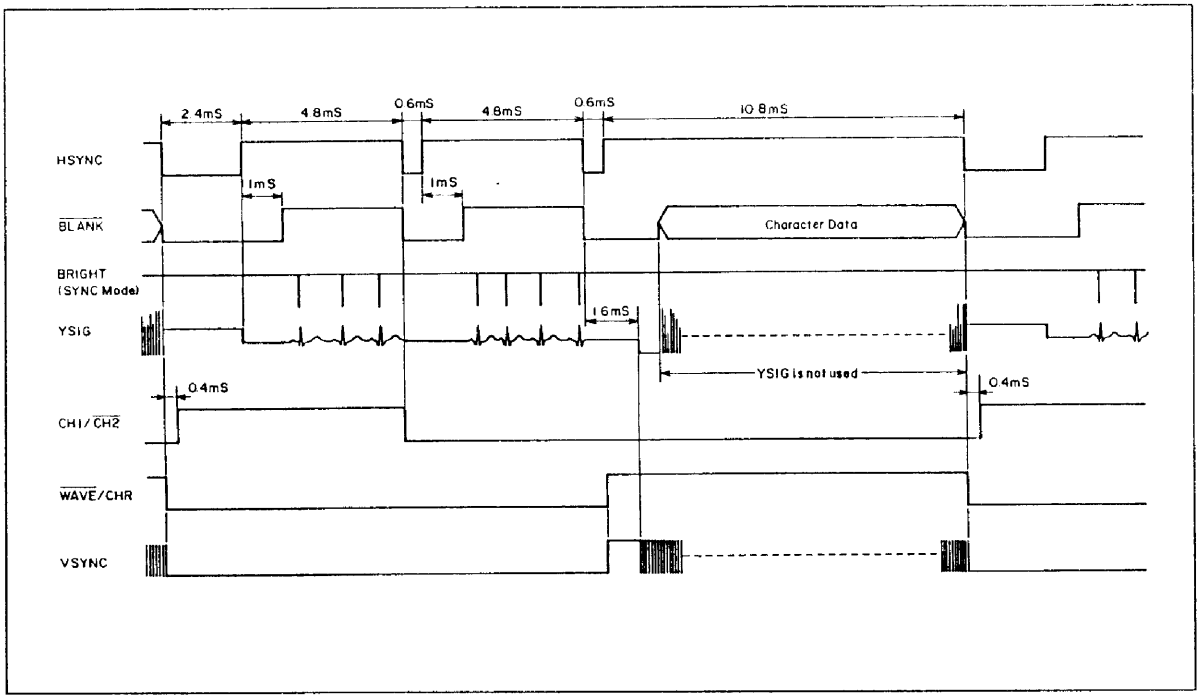
CRT CPU Data Bus Control


HALT CRT
BA
IC401
CONTROL
A8 ~ A11
IC404
RAM
IC405
CPU
IC402
A0 ~ A7
IC403
D0 ~ D7
CS CRT

One-frame Display Cycle

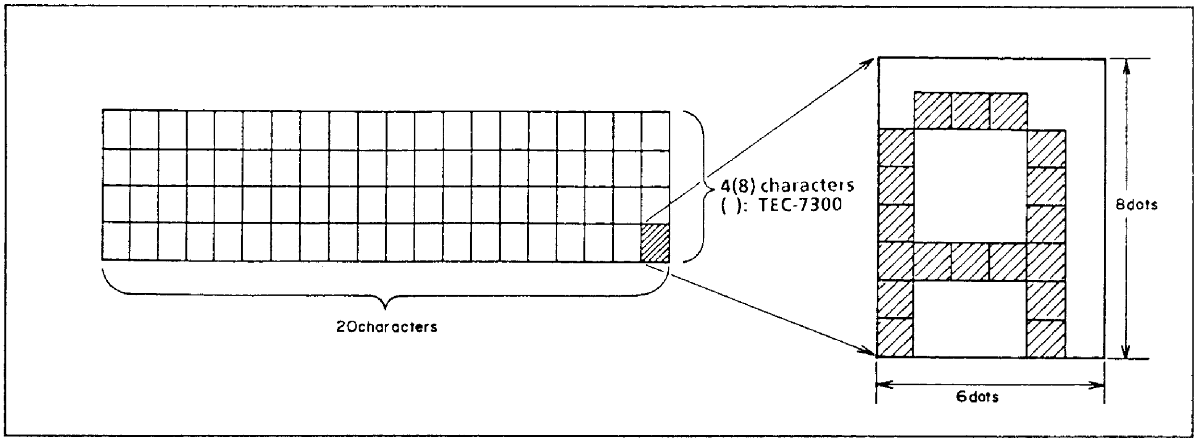
Horizontal sweeps are made while the HSYNC is high. Two sweeps for ECG waveforms and one sweep for characters are made in one cycle. The WAVE/CHR selects the display mode, the XY mode for the ECG waveforms and the raster scan mode for the characters. D/A converted waveform signal YSIG is displayed while BLANK is high. The BRIGHT pulse intensifies the brightness of the ECG waveform to display the QRS synchronized spot in SYNC mode. The vertical position of the ECG is controlled by the CH1/CH2. Raster timing for characters is controlled by the HSYNC and VSYNC. Character data modulates the BLANK.

Waveform and Character Data Transfer Timing


2.4mS
4.8mS
0.6mS
4.8mS
0.6mS
10.8mS
HSYNC
1mS
1mS
BLANK
Character Data
BRIGHT
(SYNC Mode)
1.6mS
YSIG
YSIG is not used
0.4mS
0.4mS
CH1/CH2
WAVE/CHR
VSYNC

Character Data Transfer to CRT Driver

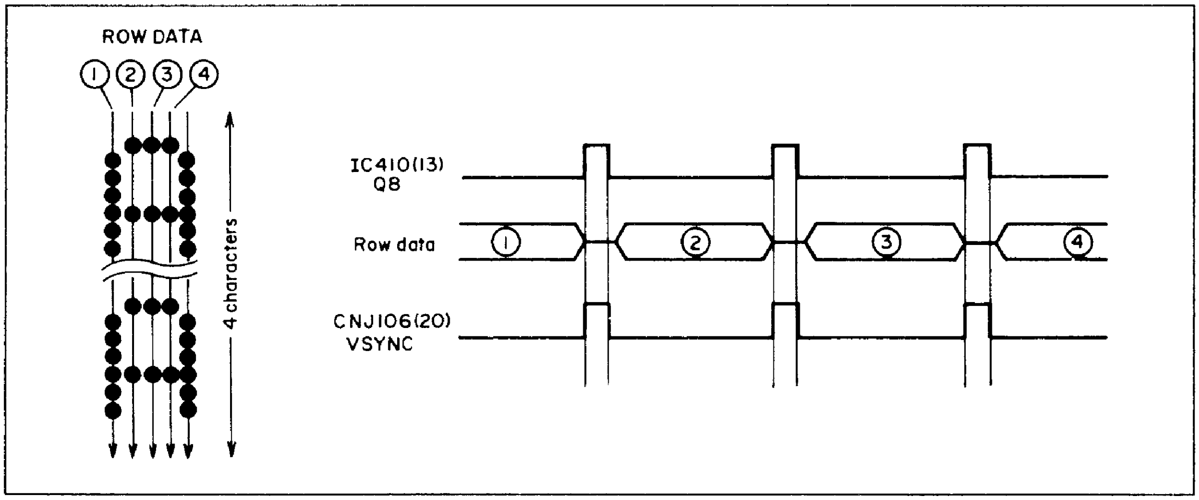
Character Display Area


4(8) characters
( ): TEC-7300
20characters
8dots
6dots

Vertical Sync VSYNC

VSYNC at CNJ106 (20) triggers a vertical scan. VSYNC is controlled by Q8 of the frequency divider IC410 (13) and P25 of the CRT CPU IC405 (14). Q8 becomes low by P23 output to reset IC410. P25 is low in character display mode. When VSYNC becomes low, the scan starts. While VSYNC is low, one vertical line data of four characters (8 dots × 4(8) characters = 32(64) dots, ( ): TEC-7300) is transferred to the CRT driver.

Character Data Transfer Timing (4 vertical scans)

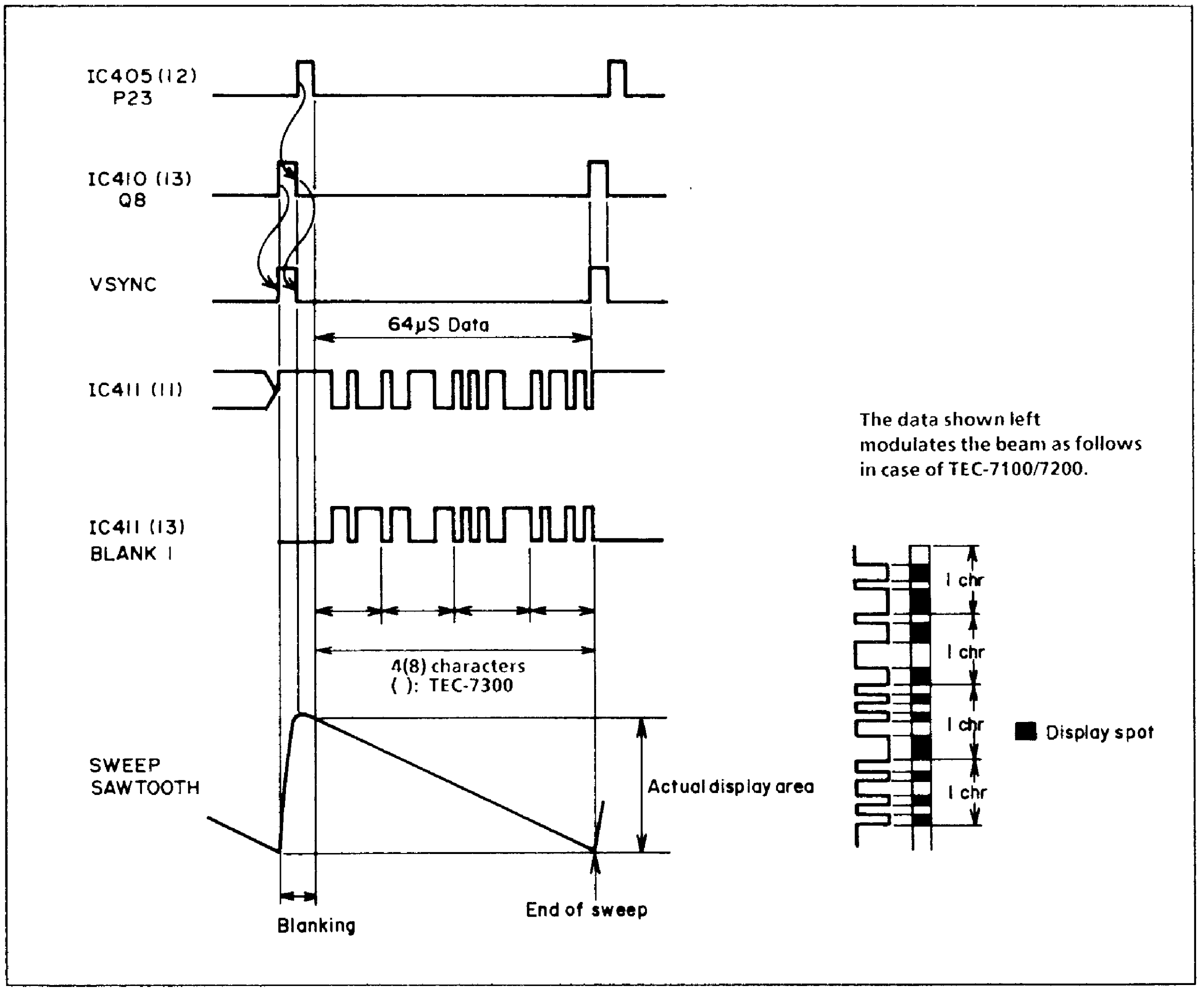

ROW DATA
①②③④
4 characters
IC410(13)
Q8
Row data
①
②
③
④
CNJ106(20)
VSYNC

Blanking BLANK1

BLANK1 has two functions : blanking the beam between the end of one sweep and the beginning of the next sweep and modulating the beam to display characters according to the character data.

After 32 dots (64 dots in TEC-7300) data are transferred, the beam is blanked according to the following logic. Q8 becomes high, VSYNC becomes high, STRB (strobe) of multiplexer IC409 (7) becomes high, Y out becomes low, IC411 (11) becomes high and BLANK1 of IC411 (13) becomes low. Then P23 of IC405 (12) becomes high, IC410 is reset, Q8 becomes low, VSYNC becomes low and the next scan starts. BLANK1 is still low because P23 is kept high. As the beginning area of the scan is not exactly linear, characters are not displayed in this area. When the scan reaches the display area, P23 becomes low, IC410 starts counting and the data is transferred. According to the data, Y of multiplexer IC409 modulates BLANK1.

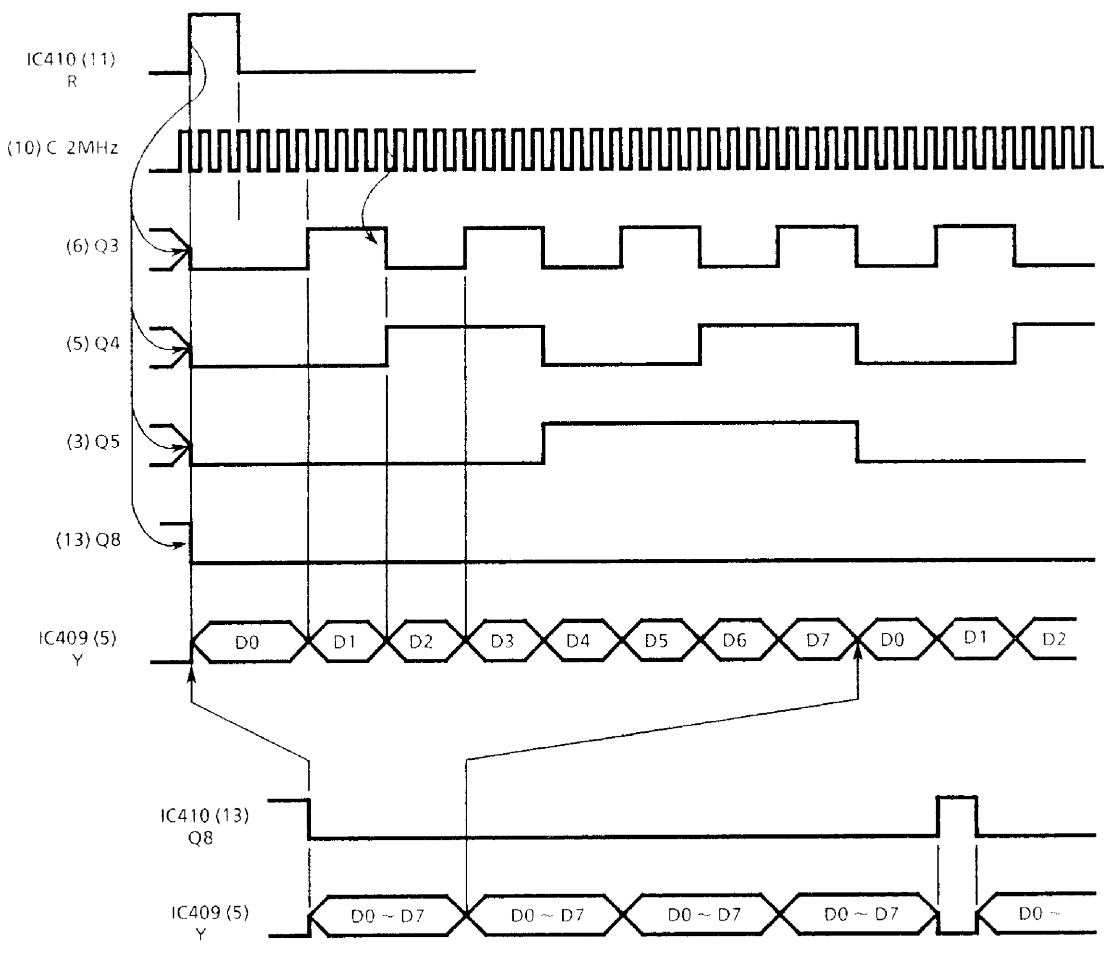
Character Data Transfer Timing (One vertical scan for 4 characters)


IC405 (12)
P23
IC410 (13)
Q8
VSYNC
64μS Data
IC411 (11)
IC411 (13)
BLANK 1
4(8) characters
( ): TEC-7300
SWEEP
SAWTOOTH
Actual display area
Blanking
End of sweep
The data shown left modulates the beam as follows in case of TEC-7100/7200.
1 chr
1 chr
1 chr
1 chr
Display spot

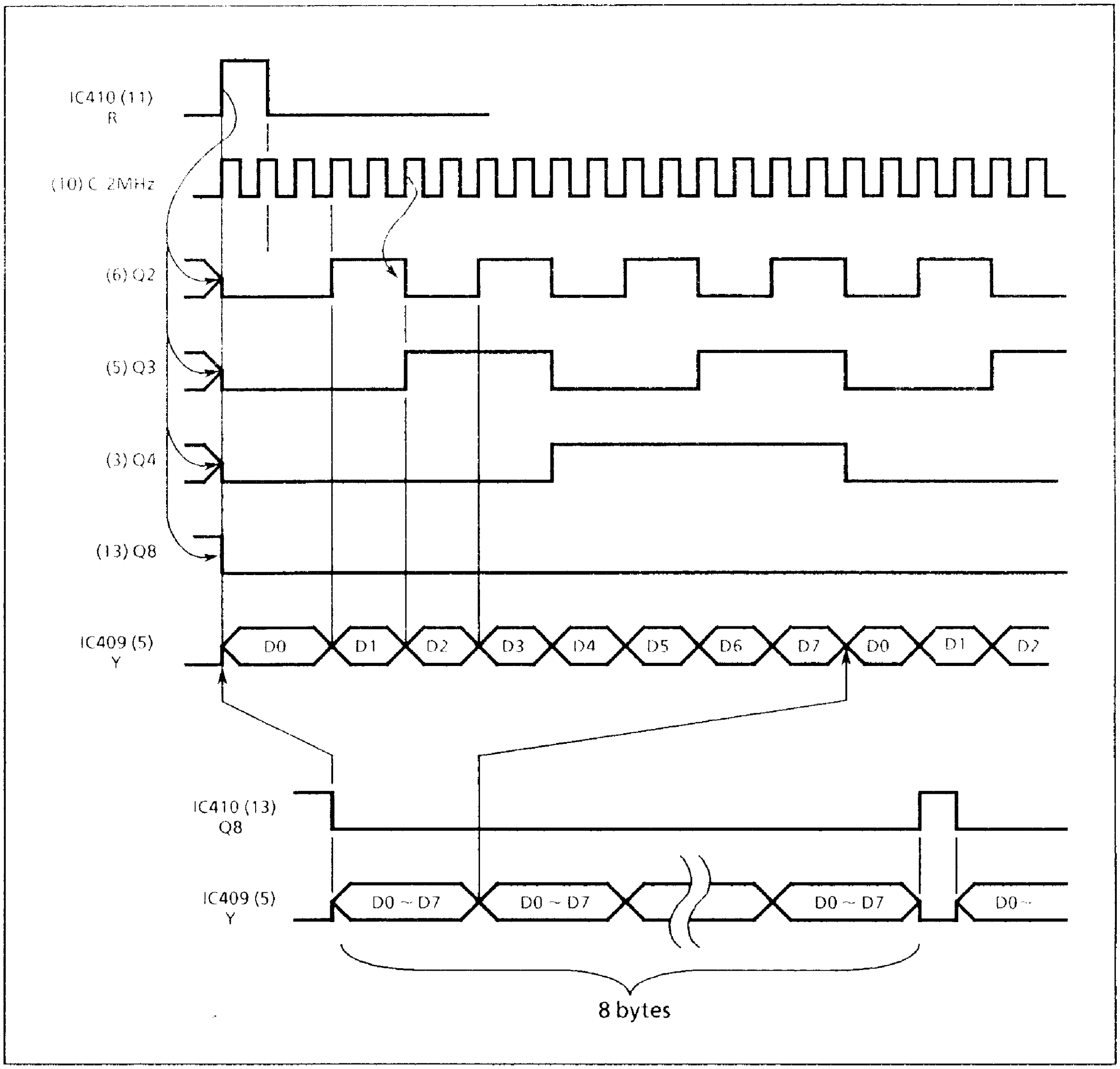
Character Data Decoding

Character data from the CRT CPU IC405 is converted from parallel data to serial data by the multiplexer IC409. Input selection of IC409 is controlled by Q3~Q5 (Q2~Q4: TEC-7300) of frequency divider IC410. The CPU supplies a clock pulse of 2MHz to IC410. When P23 IC405 becomes high, reset of IC410 is released. IC410 starts counting and IC409 outputs D0~D7. Although D0~D3 are directly sent to IC409, D4~D7 are latched by IC408. After IC409 outputs D0~D3 at Y, Q5 becomes high to latch D4~D7 in IC408. While IC410 outputs D4~D7, the next D0~D7 appears on the bus line.

Character Data Transfer Timing (One vertical scan for one character (TEC-7100/7200)


IC410 (11)
R
(10) C 2MHz
(6) Q3
(5) Q4
(3) Q5
(13) Q8
IC409 (5)
Y
D0
D1
D2
D3
D4
D5
D6
D7
D0
D1
D2
IC410 (13)
Q8
IC409 (5)
Y
D0 ~ D7
D0 ~ D7
D0 ~ D7
D0 ~ D7
D0 ~

Character Data Transfer Timing (One vertical scan for one character (TEC-7300)


IC410 (11)
R
(10) C 2MHz
(6) Q2
(5) Q3
(3) Q4
(13) Q8
IC409 (5)
Y
D0
D1
D2
D3
D4
D5
D6
D7
D0
D1
D2
IC410 (13)
Q8
IC409 (5)
Y
D0 ~ D7
D0 ~ D7
D0 ~ D7
D0 ~
8 bytes

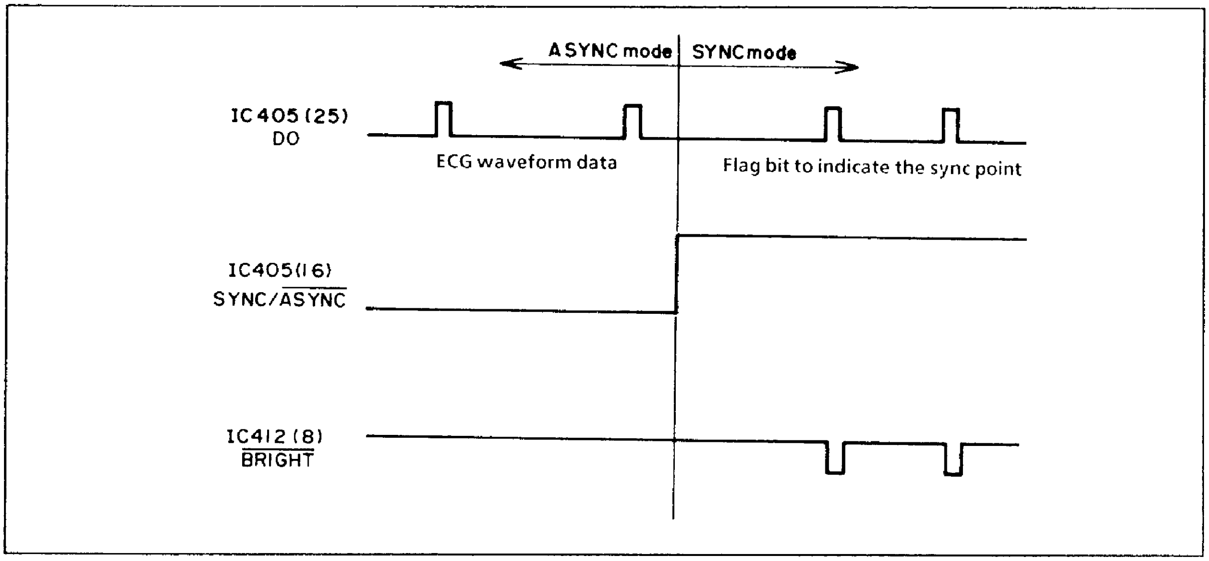
Waveform Data Transfer to CRT Driver

Digital ECG waveform data is transferred from the host CPU through RAM IC404. The data is D/A converted by IC406 and IC114-2 and sent to the CRT driver Y deflection amplifier as YSIG. In the waveform display mode, P25 of CRT CPU IC405 (14) is high so that VSYNC is blocked and BLANK1 is controlled by only P23. P23 is high between the end of one sweep and the beginning of the next one to blank the beam. CH1/CH2 at P24 of IC405(13) selects the display of waveforms. When CH1/CH2 is high, the waveform is displayed in the upper area.

QRS Sync Spot BRIGHT

In SYNC mode, the synchronized point is indicated as a spot on the QRS waveform. This spot is created by intensifying the brightness of the beam when BRIGHT is low. In SYNC mode, D1~D7 sent to IC406 are the ECG waveform data and D0 is flag bit to indicate the sync point. As D0 is also ECG waveform data in ASYNC mode, P27 of IC405 becomes low to block D0 appearing at BRIGHT.

Sync Spot Display Timing


ASYNC mode
SYNCmode
IC405(25)
DO
ECG waveform data
Flag bit to indicate the sync point
IC405(16)
SYNC/$\overline{\text{ASYNC}}$
IC412(8)
$\overline{\text{BRIGHT}}$

Peak-bottom Processing

As 1/3 of the ECG data transferred from the host CPU is used for display, peak-bottom processing is performed in software to display the peak of the steep QRS waveform accurately. The ECG waveform is A/D converted every 2 msec. In peak-bottom processing, one of the three points is selected every 6 msec. One block is comprised of three individual data. The individual data of two time-sequential blocks is compared. From each block the data with the greatest difference in amplitude from that of the data selected in the inmediately preceding block is then selected.

CRT CPU Pin Description

Pin No.	Symbol	I/O	Function
1	Vss	---	Ground
2	XTAL	---	Not used
3	EXTAL	I	Clock 8 MHz
4~5	MP0~MP1	I	Operation mode selection
6	RES	I	Reset — 0 : Resets the CPU when the power is turned on
7	STBY	I	Not used
8	NMI	I	Non-maskable interrupt — Negative edge causes restart from start address. HALTCRT is sent to this input from the host CPU.
9	P20	O	VSSET (Vertical scan set) — 0 : Until vertical scan reaches to character display area starting from the left end.
10	P21	O	HSYNC (Horizontal synchronization)
11	P22	O	WAVE / CHR — 0 : Waveform display, 1 : Character display
12	P23	O	Blanking — 1 : While blanking beam between the end and the start of sweep.
13	P24	O	CH1 / CH2 — 1 : Waveform is displayed on channel 1. 0 : Waveform is displayed on channel 2.
14	P25	O	WAVE / CHR — 0 : Character display, 1 : Waveform display
15	P26	O	LEADS OFF : Square waveform of 300 Hz is sent to the transmitter when the transmitter receives the signal from the main unit and an electrode connected to the main unit is detected.
16	P27	O	Sync mode — 1 : Sync mode
17~19	P50~P52	---	Not used
20	P53	I	HALTCRT — 0 : The CRT CPU is halted by the host CPU.
21~22	P54~P55	---	Not used
23	P56	I	CALDISP (Internal DIP SW setting) — 0 : A calibration waveform appears at the left end of the 2nd trace.
24	P57	---	Not used
25~32	P60~P67	I/O	D0~D7 — Data bus for the D / A converter
33	Vcc	I	Power — + 5 V
34~41	P47~P40	O	A15~A8 — Address bus

Pin No.	Symbol	I / O	Function
42	Vpp / OE	---	Not used
43~50	P17~P10	O	A7~A0 — Address bus
51~58	P37~P30	I / O	Data bus
59	P74	O	Bus available — 1 : The CRT CPU disconnects the bus when the CRT CPU halts.
60~61	P73~P72	---	Not used
62	P71	O	WR (Write) — 0 : Writes the data into the RAM.
63	P70	O	RD (Read) — 0 : Reads the data from the RAM
64	E	O	Clock pulse of 2 MHz for character data decoder.

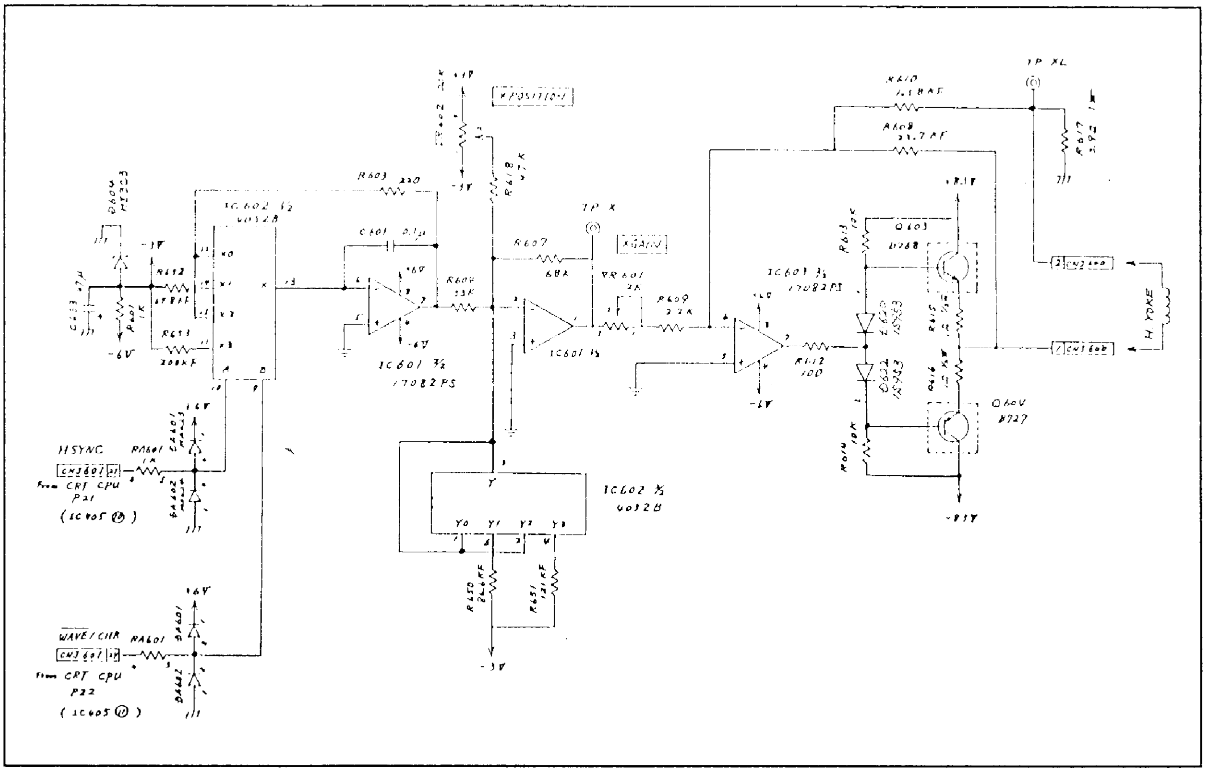
3-4 CRT Driver UP-7740

Outline

The CRT driver drives the horizontal, vertical and position yoke controlled by the signal sent from the CRT CPU to display the waveforms and characters.

The HSYNC controls a sawtooth waveform to drive a horizontal yoke for the horizontal sweep. The sweep speed, width and vertical position change according to the display mode of waveforms and characters. The display mode is controlled by the WAVE/CHR. The vertical deflection waveform also changes according to the display mode. In the waveform display mode, the YSIG is used as a vertical deflection signal. In the character display mode, the VSYNC controls a sawtooth waveform for the vertical scan and the BLANK controls beam on/off for modulation. The BLANK also blanks the beam between the end and start of both the horizontal and vertical sweep.

Horizontal Deflection Driver


HSYNC
from CRT CPU P21
WAVE/CHR
from CRT CPU P22
IC602 1/2 4052B
IC601 1/2
IC602 1/2 4052B
R603
C601
R607 68K
R604
VR601 2K
R609 2.2K
R611 100
R610
R608
R617
TP X
TP XL
Q603
Q604
D620
D622
-5V
+5V
-6V
+6V
+13V
-13V
H YOKE
X POSITION
X GAIN
R650
R651

The HSYNC triggers the integrator IC601-2 to generate sawtooth waveforms. The horizontal deflection waveform changes according to the display mode controlled by the WAVE/CHR. The sweep width is determined by the amplitude of the sawtooth which is controlled by IC602-1. The sweep time is detemined by the HSYNC timing. The horizontal position is controlled by IC602-2. The relationship between control signals and outputs is as follows.

Horizontal Sawtooth Control IC602

Display mode	Control		Output	
	A (HSYNC)	B (WAVE/CHR)	X	Y
Blanking	0	x	X0 / X2	Y0 / Y2
Waveform	1	0	X1	Y1
Character	1	1	X3	Y3

x : Irrelevant

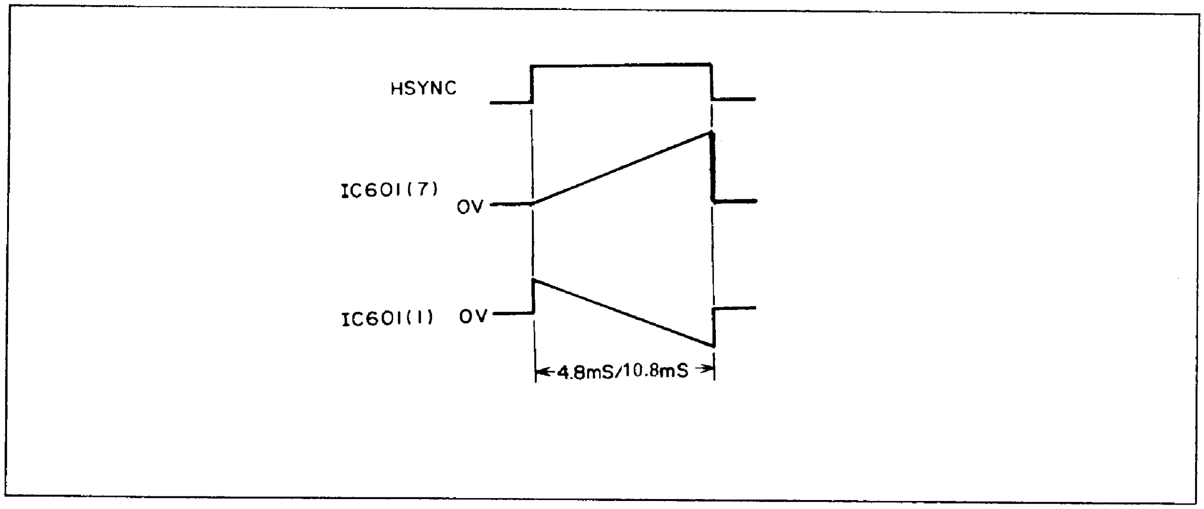
Sweep Speed Control

The sweep speed is controlled by the charging speed of the integrator IC601-2. In the character display mode, the WAVE/CHR is high. When the HSYNC becomes high, −3V is connected to C601 through R653 and integration starts. The charging speed is determined by R653 and C601. When the HSYNC becomes low, C601 is discharged through R603. In the waveform display mode, the WAVE/CHR is low. Therefore the charging speed is determined by R652 and C601.

Horizontal Position Control

The offset voltage controlled by IC602-1 is added to the sawtooth to shift the level so that the center of the sawtooth and the level of blanking period become 0V. This offset voltage addition is controlled by the HSYNC and WAVE/CHR. In the character display mode, when the HSYNC is low, −3V is connected to IC601-1 through R651. The offset of −3V × (R607/R651) is added to IC601-1. In the waveform display mode, the offset of −3V × (R607/R650) is added. These offset voltages are added only when HSYNC is high. The horizontal position for both the waveforms and characters is adjusted by VR602.

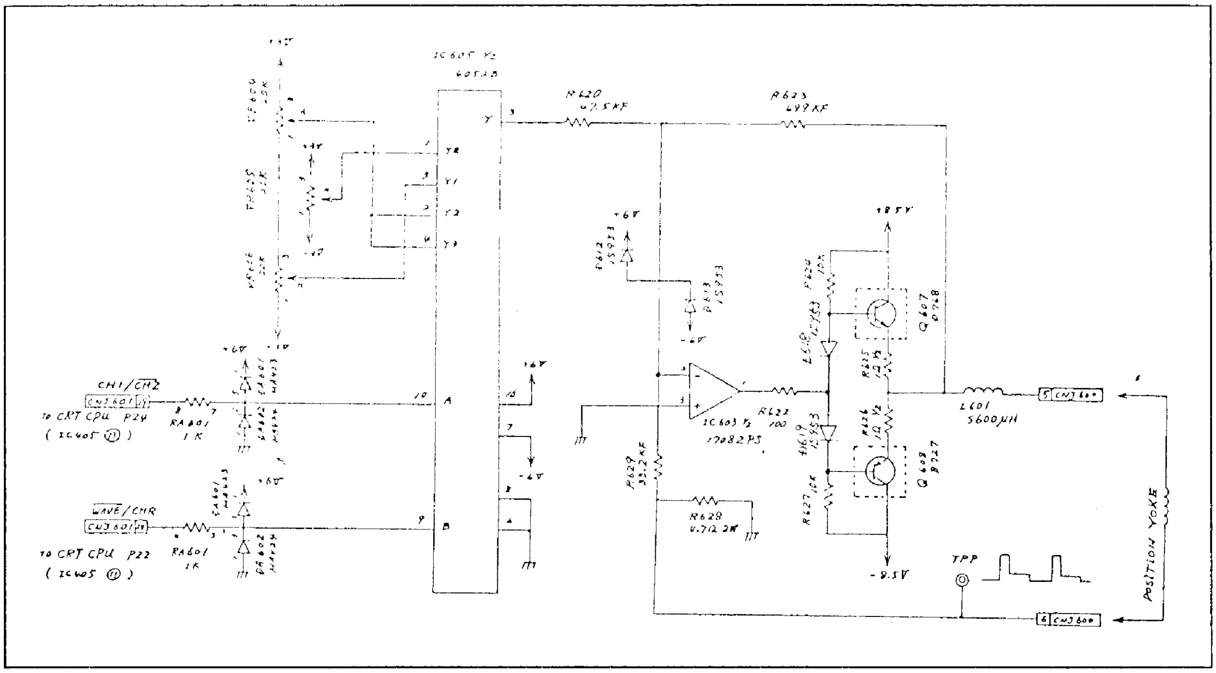
Horizontal Sweep Sawtooth



Driver

When the input voltage of IC603-2 becomes a positive maximum, the output becomes negative, the base voltage of Q603~604 decreases, the emitter voltage decreases and becomes negative, current flows from CNJ600-2 to CNJ600-1 through the yoke, and the sweep is initiated at the left end of the screen. IC603-2 has two feedback loops. The main feedback is through R610, and the yoke is delayed due to the inductance of the yoke. The feedback through R608 compensates this delay to return the beam quickly. Then the horizontal deflection width is adjusted by VR601.

Vertical Position Control


IC605 ½
4051B
Y
Y0
Y1
Y2
Y3
A
B
R620
47.5KF
R623
499KF
+6V
-6V
+8.5V
-8.5V
D612
1S953
D613
1S953
R624
10K
Q607
D768
D618
1S953
R625
1Ω ½
R626
1Ω ½
Q608
B727
R627
10K
D619
1S953
R622
100
IC603 ½
17082PS
R629
33.2KF
R628
4.7Ω 2W
L601
5600μH
CN3600
TPP
POSITION YOKE
CH1/CH2
CN3601
TO CRT CPU P24
(IC405 ⑪)
RA601
1K
DA601
DA602
WAVE/CHR
TO CRT CPU P22
(IC405 ⑩)

This circuit controls vertical positions for characters and ECG of channel-1 and -2. Current for the position yoke is controlled by CH1/CH2 and WAVE/CHR sent from the CRT CPU. The relationship between control signals and outputs is shown below.

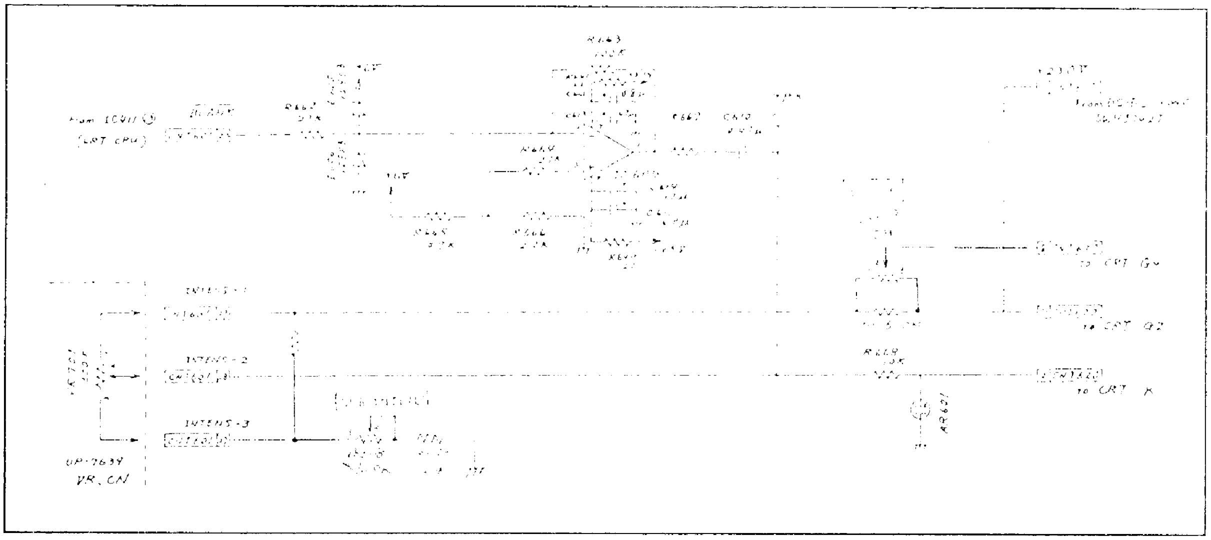
Position Control IC605

Control		Output	Display mode
A (CH1/CH2)	B (WAVE/CHR)		
X	1	Y2 / Y3	Character
1	0	Y1	Waveform CH-1
0	0	Y0	Waveform CH-2

X : Irrelevant

For example, when channel-1 is selected, negative voltage is applied to IC603-1 (2), the output increases, the base voltage of Q607~608 increases, the emitter voltage increases, the yoke current increases and the baseline position goes up. Feedback through R629 is delayed by the inductance of L601 and the yoke. Feedback through R623 compensates for this delay.

Blanking

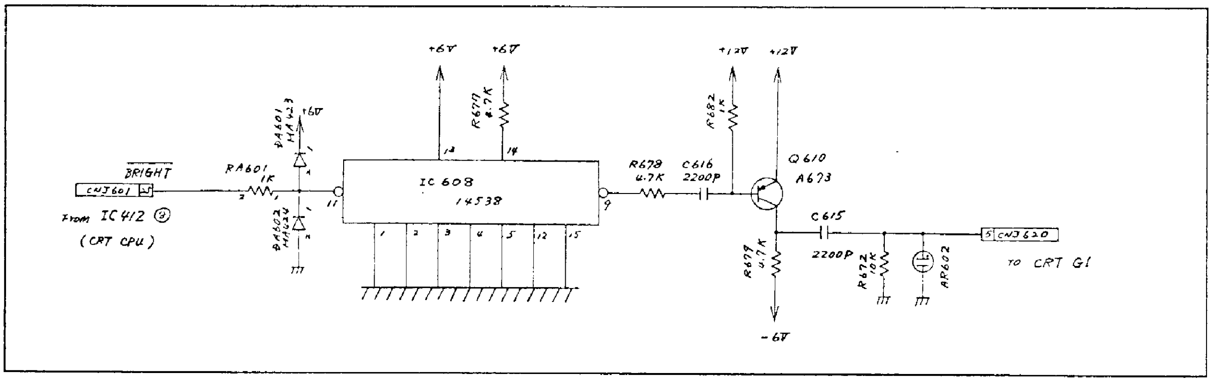


The BLANK controls the cathode voltage to turn on/off the beam. IC604 amplifies the BLANK (0 or +5V) to provide a saturated output with an offset of +1.9V. The cathode voltage of +230V divided by R674~676, R671, R673 and VR701. When the BLANK is low, the cathode voltage increases to turn off the beam.

VR608 adjusts the adjusting range of VR701 for intensity control.

VR609 adjusts the voltage of G4 for focus control.

QRS Sync Spot


+6V
+6V
+12V
+12V
R677 4.7K
R682 1K
DA601 MA423
+6V
BRIGHT
CNJ601
RA601 1K
From IC412 ⑧
(CRT CPU)
DA602 MA424
IC 608
14538
R678 4.7K
C616 2200P
Q610
A673
C615
CNJ620
2200P
R679 4.7K
R672 10K
AR602
TO CRT G1
-6V

The QRS synchronized point is displayed as a spot on the QRS waveform. When the BRIGHT becomes low, the monostable multivibrator IC608 generates a low pulse and the grid voltage increases to intensify the beam brightness. Stray capacity narrows the pulse width of IC608.

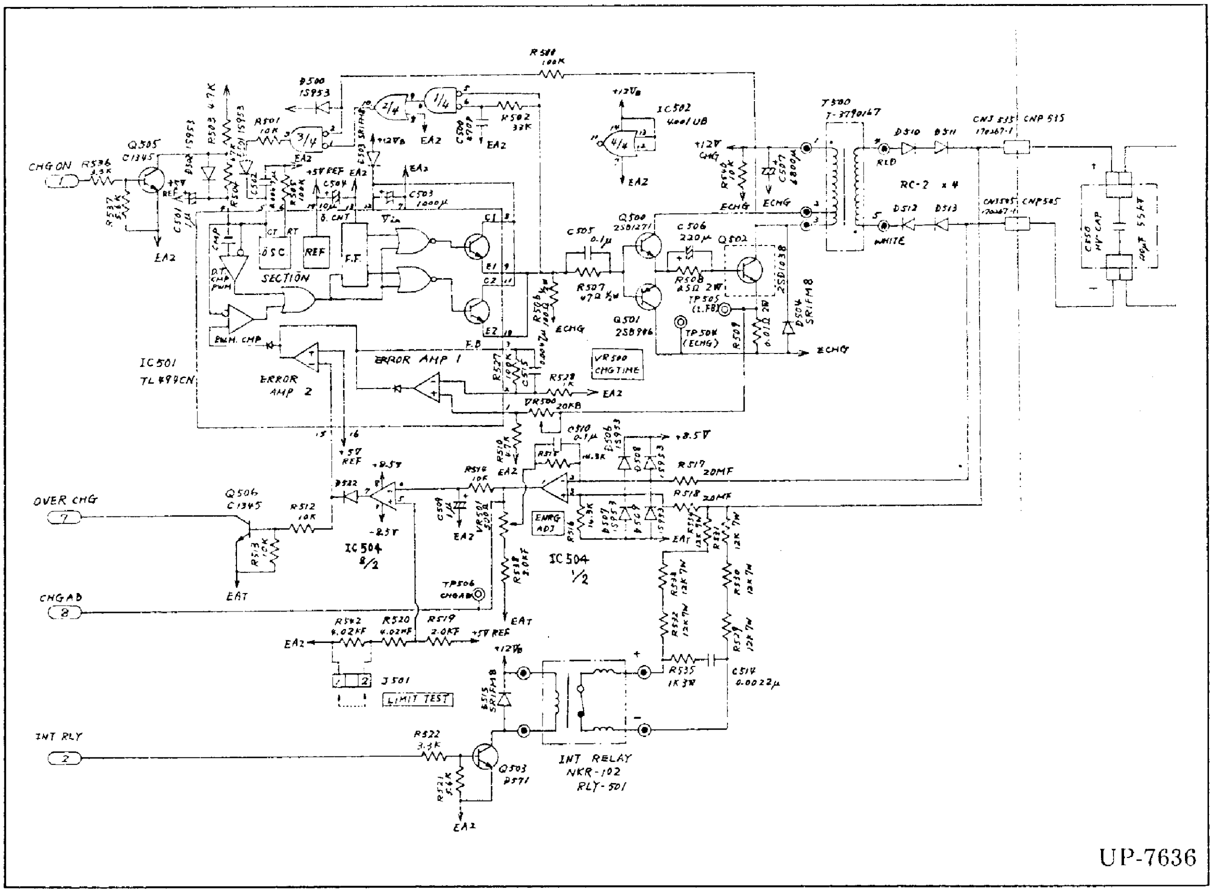
3-5 High Voltage Board UP-7636/7851

Outline

This unit generates a high voltage to charge the energy and controls charging and discharging. The charge energy is monitored by the host CPU through the A/D converter. For safety, the charged energy is also monitored by the comparator to avoid overcharge. The integration of the discharge current change measured when the energy is discharged is sent to the host CPU to calculate the TTR (Transthoracic Resistance) and delivered energy (TEC-7200/7300 only).

Switching Control

Switching Control, Charge Energy Monitor and Internal Discharge


CHG ON
1
R536 3.3K
R537 5.6K
Q505 C1345
EA2
D500 1S953
R503 4.7K
R501 10K
3/4
2/4
1/4
R502 33K
C500 470P
R511 100K
+12VB
IC502 4001UB
4/4
+5V REF
C501 1µ
C502
R505 100K
C504 10µ
C503 1000µ
D.T. CNT
CT
RT
OSC
REF
F.F.
SECTION
D.T. CMP PWM
PWM. CMP
C1
E1
C2
E2
F.B
ERROR AMP 1
ERROR AMP 2
IC501 TL494CN
R527 100K
C515
R528 1K
VR500 20KB
VR500 CHG TIME
R506 100Ω
ECHG
C505 0.1µ
R507 47Ω ½W
Q500 2SD1271
Q501 2SB946
C506 220µ
Q502 2SD1038
R508 25Ω 2W
TP505 (I.FB)
TP504 (ECHG)
R509 0.01Ω 2W
D504 SRIFM8
+12V CHG
R540 10K
C507 4800µ
T500 7-3790167
RED
WHITE
D510
D511
D512
D513
RC-2 × 4
CNJ 535 CNP 535
CNJ 545 CNP 545
C550 HV-CAP 55KV
+
−
R510 4.7K
C510 0.1µ
D506 1S953
R515 14.3K
+8.5V
R517 20MF
R518 20MF
R516 14.3K
D507 1S953
EMRG ADJ
EAT
+5V REF
+8.5V
−8.5V
D522
R514 10K
C509 1µ
VR501 500Ω
R538 2.0KF
IC504 ½
IC504 2/2
OVER CHG
7
Q506 C1345
R512 10K
R513 10K
CHGAD
8
TP506 CHGAD
R542 4.02KF
R520 4.02KF
R519 2.0KF
J501
LIMIT TEST
R533 12K 7W
R531 12K 7W
R534 12K 7W
R530 12K 7W
R532 12K 7W
R529 12K 7W
R535 1K 3W
C514 0.0022µ
+12VB
D515 SRIFM8
INT RLY
2
R522 3.3K
R521 5.6K
Q503 D571
INT RELAY NKR-102 RLY-501
UP-7636

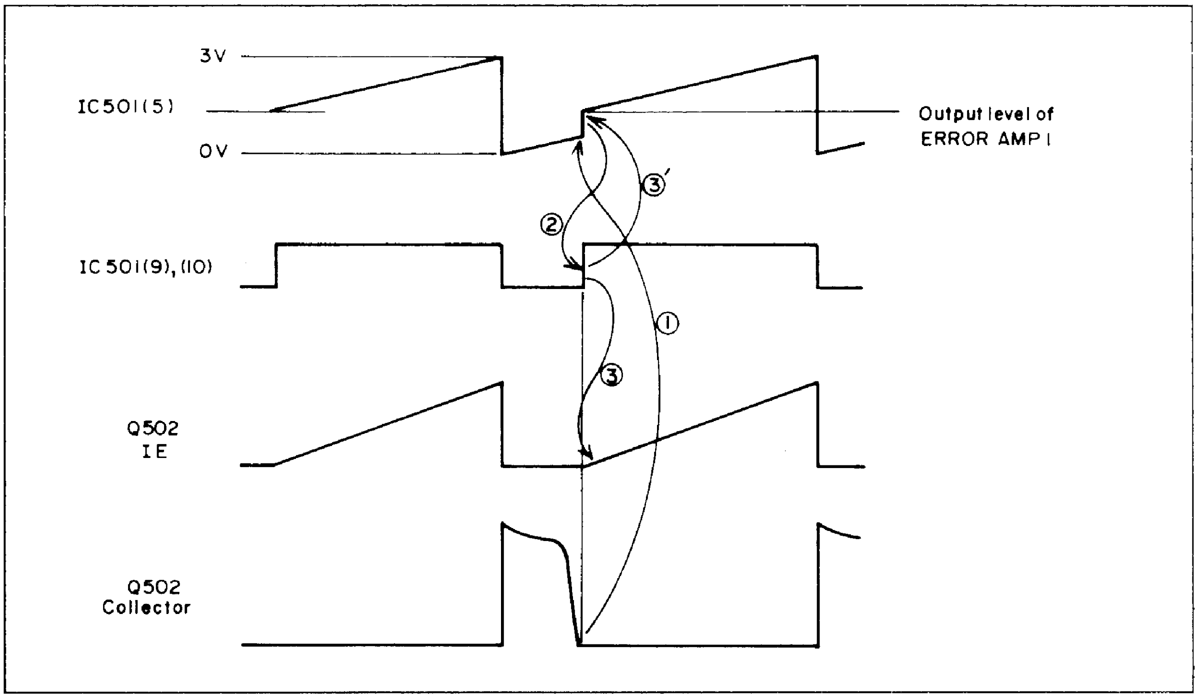
The switching regulator controller IC501 controls the switching of the transistor Q500~Q502. IC501 comprises the oscillator, dead time comparator, PWM comparator, two error amplifiers, flip-flop, output control and reference voltage generator. Energy charging start/stop is controlled by the dead time comparator and the error amplifier-2. The error amplifier-2 protects the circuit from overcharging. The error amplifier-1 controls the output pulse width to regulate the output current. The dead time and PWM comparators compare the level of the sawtooth waveform generated by the built-in oscillator with the level of the control signal.
When not charging, the CHGON is low, IC501 (4) is high, the dead time comparator has a constantly high output as the control input level is higher than the sawtooth input level, and the output transistors are turned off. When the charge button is pressed, the CHGON becomes high, (4) becomes low gradually due to C501. When the control input level becomes lower than the peak level of the sawtooth, the dead time comparator outputs pulses to turn on/off the output transistors for charging. Then (4) continues to become lower, when the control input level becomes lower than the bottom level of the sawtooth, the dead time comparator constantly outputs low. At this time switching is controlled by the PWM comparator.

The PWM comparator compares the sawtooth with the output of the error amplifiers. The pulse width of the PWM comparator is controlled by the output level of the error amplifier-1. The output current through R509 is converted into the voltage. The error amplifier-1 provides the mean voltage to the PWM comparator. When the current increases, the turn-on time of the output transistors is shortened and the current is regulated.

When the output of IC501 (9)/(10) is high, Q500 and Q502 turn on and the current flows through T500. The current is a sawtooth waveform due to the inductance of T500. The sawtooth at IC501 (5) becomes 0V when it reaches +3V, Q502 turns off, the collector potential of Q502 becomes high and the energy stored in the primary winding is transferred to the secondary winding. After one pulse charging, the collector potential of Q502 becomes 0V.

① The collector of Q502 is 0V. As Q502 is turned off, IC502 (10) is low. IC502 (3) outputs high, C502 is charged and the level of IC501 (5) goes up.
② The level of IC501 (5) exceeds the output level of the error amplifier-1 and IC501 (9)/(10) becomes high.
③ The current of Q502 increases.
③' The output of IC501 (9)/(10) becomes high, IC502 (3) becomes low, D501 turns off and the sawtooth slope is controlled by the internal oscillator.

High Voltage Switching Timing



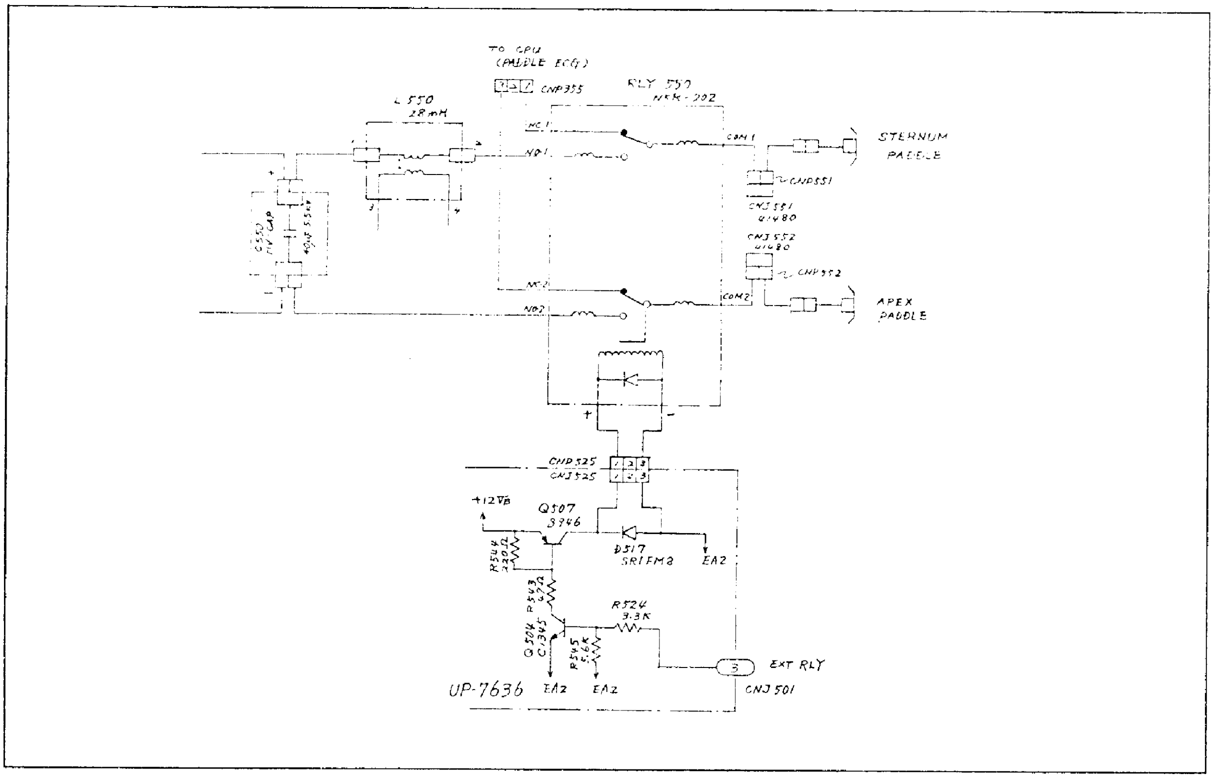
Charge Energy Monitor

IC504-1 divides the charged voltage in C550 by 1/1250 and the resulting voltage is sent to the A/D converter of the ECG/CPU as the CHGAD. IC504-2 also monitors the charged voltage for safety. If the circuit is faulty and the voltage of C550 exceeds 5 kV, the CHGAD at TP506 becomes +4V, IC504-2 saturates to negative, D522 turns off, the control input of the error amplifier becomes 0V, the error amplifier's output is high, the PWM comparator's output is constantly high and charging stops. At the same time, Q506 turns off, the OVERCHG becomes high (pulled up in the ECG/CPU), the host CPU makes the CHGON low, discharges the energy internally and displays "ERROR4" on the CRT.

Internal Discharge

When the energy is not charged, the INTRLY is low, Q503 turns off and the internal discharge relay RLY501 is closed and C550 is not charged. When the energy is charged, RLY501 opens. When discharging the energy, internally in the same manner as above, RLY501 is closed and the charged energy is consumed through R529~534. D515 protects Q503 from damage due to the counter-electromotive force of the inductance of RLY501 when Q503 turns off.

External Discharge


TO CPU
(PADDLE ECG)
CNP355
RLY 550
NFR-202
L 550
28 mH
NC1
NO1
COM1
STERNUM
PADDLE
CNP551
CNJ551
01480
CNJ552
01480
CNP552
NC2
NO2
COM2
APEX
PADDLE
C550
HV CAP
40μF 5.5kV
+
−
CNP525
CNJ525
+12VB
Q507
3946
R544
220Ω
D517
SR1FM8
EA2
R543
47Ω
Q504
C1345
R524
3.3K
R545
5.6K
EXT RLY
CNJ501
UP-7636
EA2
EA2

The charged energy is discharged to the paddles by the relay. The relay RLY550 is usually set to the paddle lead ECG position. When the EXTRLY becomes high, Q504 and Q507 turn on, RLY550 connects the paddle to C550 to discharge energy. 300 msec. later, EXTRLY becomes low. D517 protects Q507 from damage due to the counter electromotive force of inductance of RLY550 when Q507 turns off.

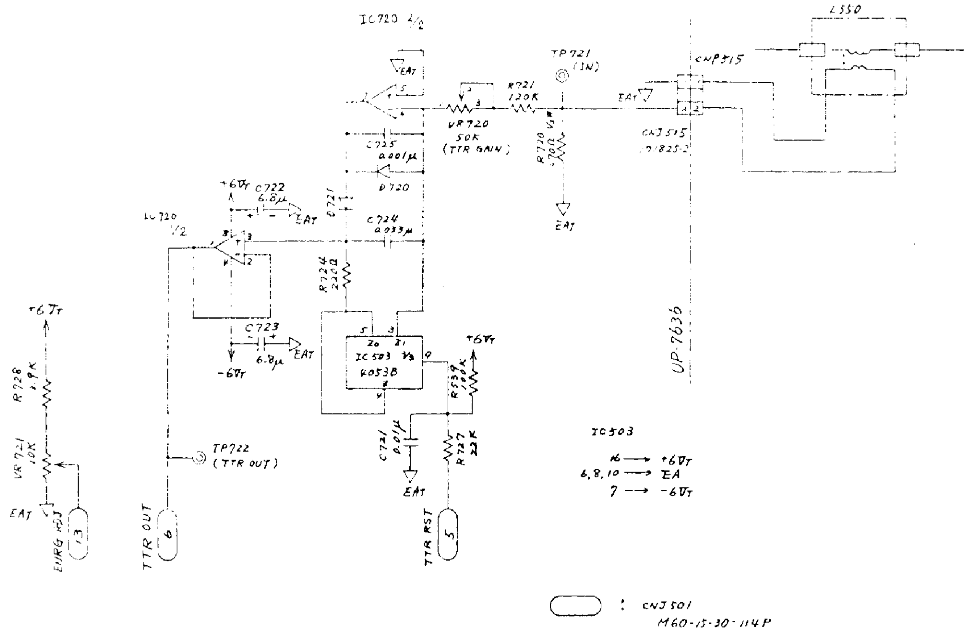
A part of the discharged energy is consumed by the internal resistance of 9Ω in the circuit. The energy selector indicates the energy level for the load of 50Ω. Therefore the indicated energy level is :

(Indicated energy) = (Stored energy) × 50/(50 + 9)

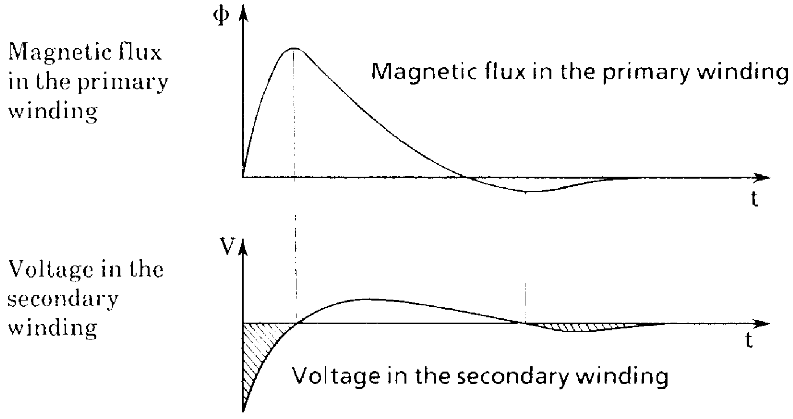
When the transthoracic resistance is RΩ :

(Delivered energy) = (Stored energy) × R/(R + 9)

TTR Detection (Not used in TEC-7100)

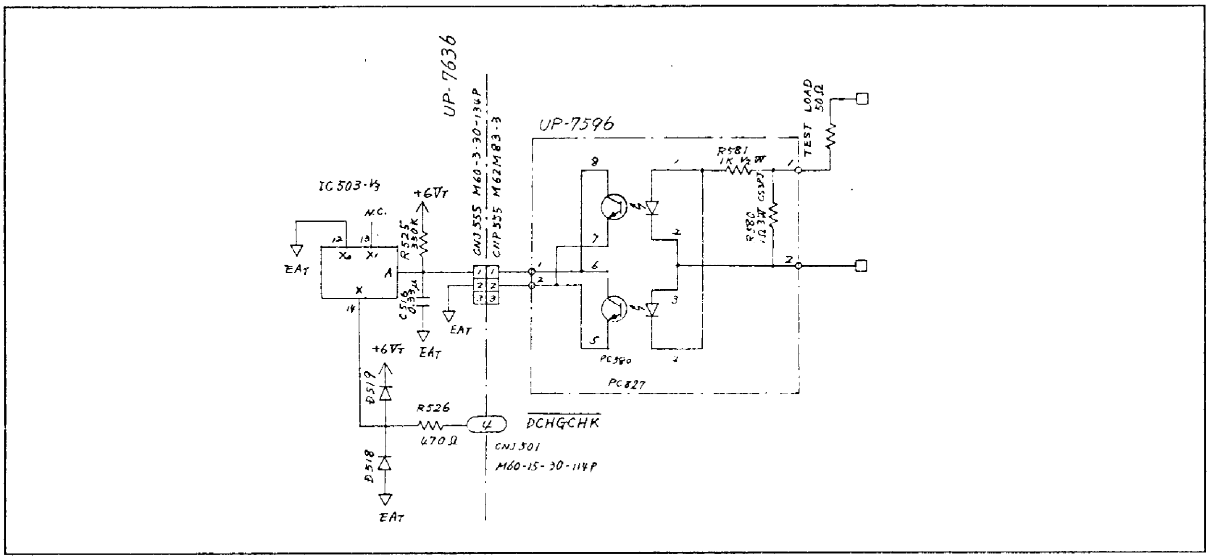

IC720 1/2
TP721 (IN)
R721 120K
VR720 50K (TTR GAIN)
C725 0.001μ
D720
C722 6.8μ
C721
C724 0.033μ
R724 22Ω
IC720 1/2
C723 6.8μ
IC503 1/4 4053B
R539
R727 22K
C731 0.01μ
TP722 (TTR OUT)
TTR OUT 6
TTR RST 5
R728 1.9K
VR721 10K
EURG ADJ 13
L550
CNP515
CNJ515
UP-7636
IC503
16 → +6VT
6,8,10 → EA
7 → -6VT
CNJ501 M60-15-30-114P
EAT
+6VT
-6VT

When the energy is discharged externally, the change of magnetic flux in the primary winding of L550 induces the voltage in the secondary winding, the negative voltage at the secondary winding is integrated, and the host CPU calculates the TTR and delivered energy according to the integrated value.



An integrator with a rectifier IC720-2 integrates this change of the negative area. When the input of IC720-2 is negative, D721 turns on and C724 is charged for integration. When positive, D720 turns on and C724 is not charged. The integrated value TTROUT is sent to the A/D converter of the ECG/CPU through the buffer amplifier IC720-1. The host CPU calculates the TTR and delivered energy. The TTRGAIN VR720 adjusts the integration value. The ENRGADJ at CNJ501 (13) is the reference for calculation. After discharge, the TTRRST becomes high to reset the integrator.

Discharge Test Detection


UP-7636
UP-7596
IC503-1/3
N.C.
+6VT
R525 330K
C516 0.33μ
EAT
CNJ555 M60-3-30-136P
CHP555 M62M83-3
R581 1K 1/2W
R580 1Ω 3W CS3PJ
TEST LOAD 50Ω
PC580
PC827
D519
D518
R526 470Ω
DCHGCHK
CNJ501 M60-15-30-114P

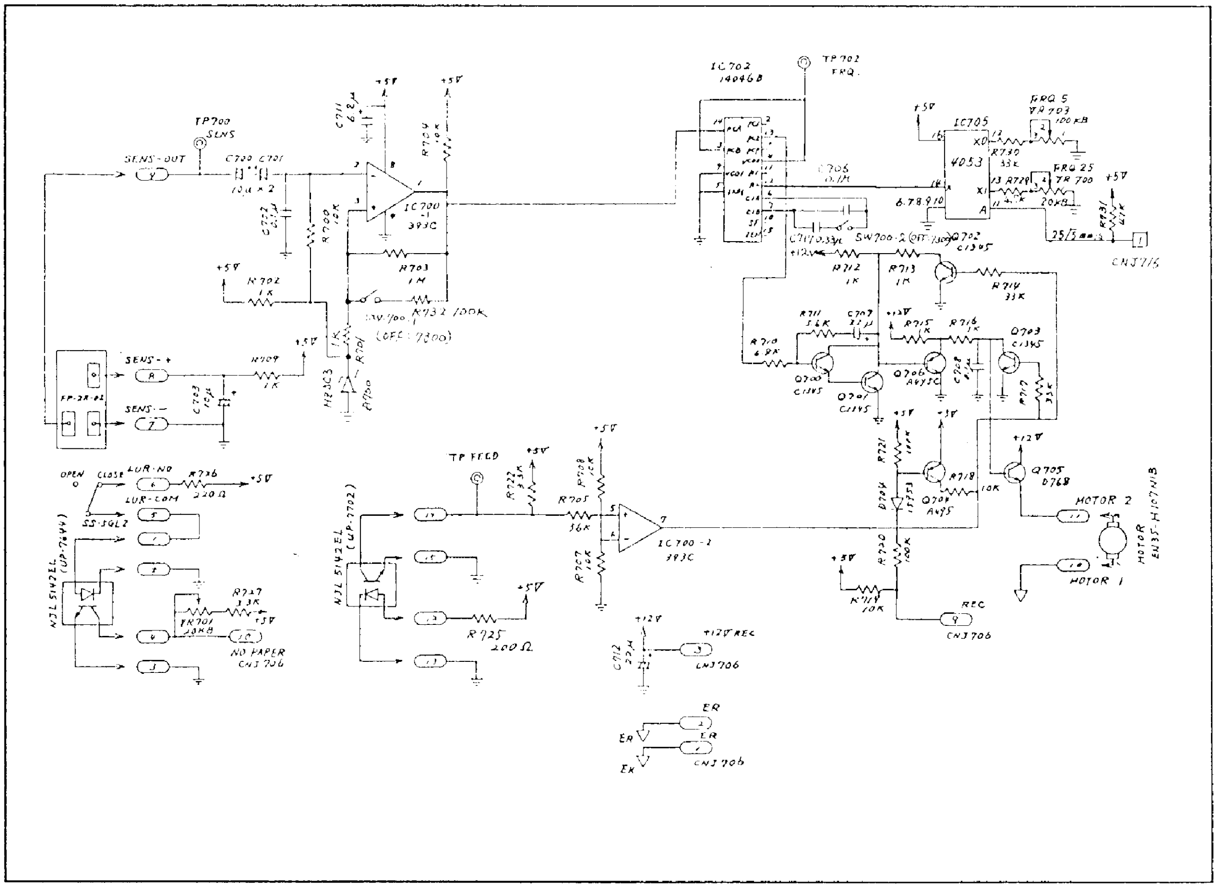
The host CPU recognizes that the energy is discharged to the test load by the DCHGCHK. When the energy is discharged to the test load, the photocoupler PC580 turns on and a low pulse is applied to the multiplexer IC503-1 to generate the low pulse DCHGCHK. C516 and R325 widens the pulse width.

This circuit of TEC-7100 checks whether the energy is discharged to the test load. This circuit and TTR detector of TEC-7200 check whether the proper amount of energy is discharged to the test load.

3-6 Motor Drive Control UP-7738

Outline

The paper feeding motor is controlled by the control signal from the host CPU. The rotation of the motor is regulated by the feedback from the rotation sensor. The opening of the head and the running out of paper are sensed and the signals are sent to the host CPU. For the thermal head operation, see the Data Transfer to Recorder section of 3-3-1 Host CPU.


TP700 SENS
SENS-OUT
C700 C701
10μ × 2
C722 0.1μ
R700 10K
C711 6.8μ
+5V
R704 10K
IC700 -1
393C
R703 1M
R702 1K
SW700-1
R732 100K
(OFF: 7300)
R701 1K
HZ3C3
R750
SENS-+
SENS-−
R709 1K
C703 10μ
FP-2R-01
IC702
14046B
TP702 FRQ.
C706 0.1M
C717 0.33μ
SW700-2 (OFF: 7300)
IC705
4053
R730 33K
FRQ 5
VR703 100KB
FRQ 25
VR700 20KB
R729 4.7K
R731 47K
25/5mm/s
CNJ715
6.7.8.9.10
+12V
R712 1K
R713 1K
Q702 C1345
R714 33K
R711 5.6K
C707 22μ
R710 6.8K
R715 1K
R716 1K
Q703 C1345
Q700 C1345
Q701 C1345
Q706 A495C
C708 0.1μ
R717 33K
R721
D704 1S953
Q704 A495
R718 10K
Q705 D768
MOTOR 2
MOTOR 1
MOTOR EN35-H107N1B
R720 120K
R719 10K
REC
CNJ706
TP FEED
R722 33K
R708 10K
R705 56K
R707 10K
IC700 -2
393C
NJL5142EL (UP-7702)
R725 200Ω
+12V
C712 22μ
+12V REC
ER
OPEN
CLOSE
LUR-NO
LUR-COM
R736 220Ω
SS-5GL2
NJL5142EL (UP-7744)
R727 3.3K
VR701 20KB
NO PAPER

Rotation Sensor

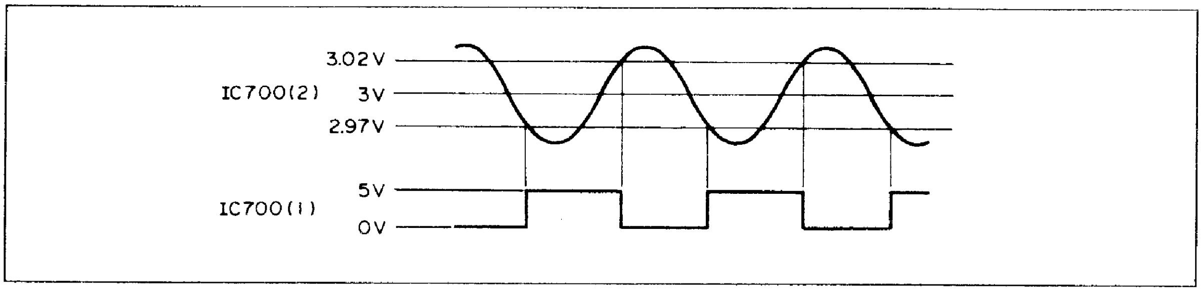
A power of +5V is supplied to the magnetic rotation sensor. R709 and C703 cut a high frequency noise. The sensor outputs a sine waveform of several hundreds mV. The frequency of the waveform corresponds to the rotation of the motor. IC700-1 is a hysteresis comparator with an offset of +3V by D700. R701 and R703 determine the hysteresis characteristic. When the potential of IC700-1 (2) is higher than (3), the output becomes 0V and the potential of (3) V(3) is;

$$V(3) = 3 - 3 \times R701/(R701 + R703)$$
$$\simeq 2.97V$$

When the potential of (2) decreases less than V(3), the output becomes +5V and the potential of (3) V(3) is;

$$V(3) = (5 - 3) \times R701/(R701 + R703) + 3$$
$$\simeq 3.02V$$

Waveform Shaping of Rotation Sensor



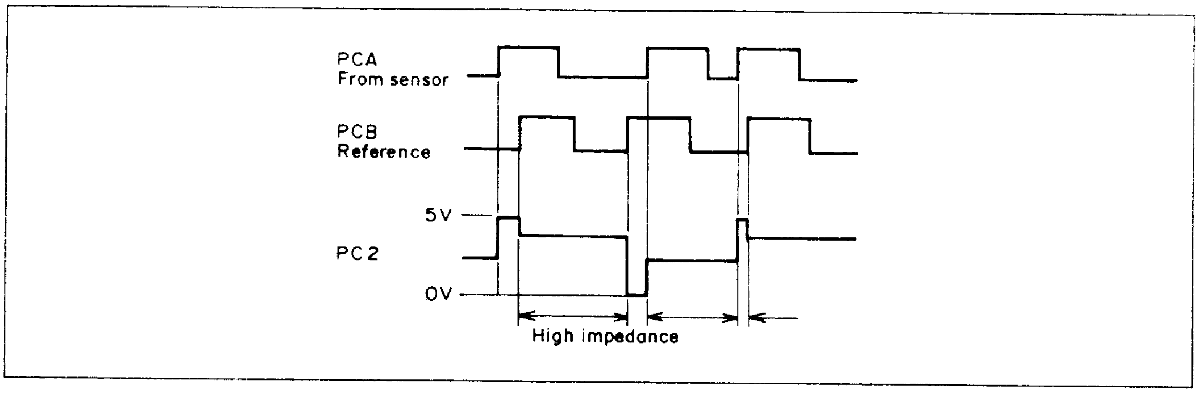
SW700-1 changes the gain of the amplifier. This switch is set to on for the TEC-7300 to increase the gain, as the output level of the sensor of the TEC-7300 is smaller than that of the TEC-7100/7200.

Phase Locked Loop

PLL IC702 compares the phase of the sensor signal PCA and the reference signal to regulate the rotation of the motor. When the motor rotates faster than specified, the advanced phase generates the positive level as shown below.

The frequency of the reference signal PCB is determined by the resistors connected to IC702 (12) and the capacitors connected to IC702 (6) and (7). The frequency is 294.8Hz in the TEC-7100/7200, and 1178.9Hz (25mm/s) or 235.8Hz (5mm/s) in the TEC-7300. Analog switch IC705 selects the frequency of the reference signal with the paper speed select signal 25/5mm/s. In the TEC-7100/7200, this select signal is fixed too high.

PLL Phase Comparison Timing



Integrator

R710~712 and C707 smoothen the output of IC702. When the motor rotates faster than specified, IC702's output is high, the base potential of TR700 increases, the potential of the collector of TR701 decreases, the potential of the emitter of TR706 and 705 decreases and the motor rotation is slowed. In contrast, when the motor rotates more slowly, the rotation is accelerated in the opposite manner.

Start / Stop Control

The REC from the host CPU controls the start/stop of the motor. When the REC is low, TR704 turns on, TR702~703 turn on, and TR705 turns off to stop the motor. When the REC is high, the motor runs.

Paper Feed Control

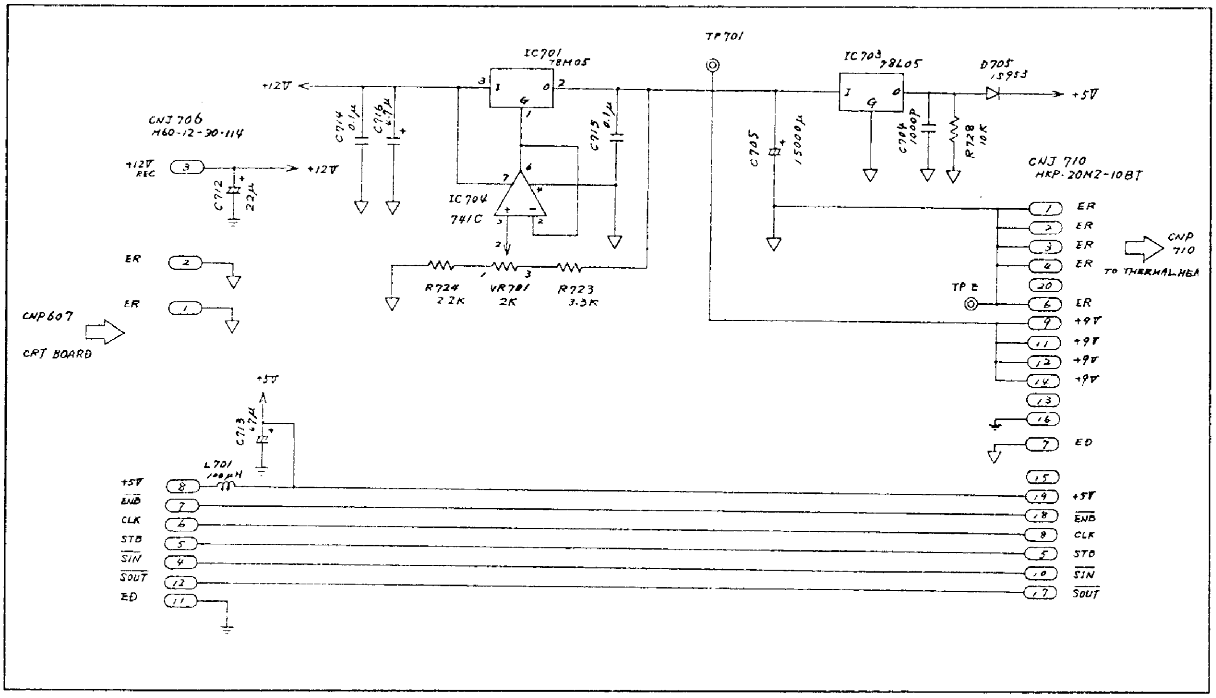
Paper feed lever action is sensed by the photo-reflector comprised of an LED and a sensor. The paper feed lever is linked to the reflector which moves together with the lever position. The reflector is usually positioned so that the light emitted from the LED does not reach the sensor. When the sensor does not receive the light, (14) and (15) of CNJ700 are open, the open collector comparator IC700-2 turns off and the start/stop is controlled by the REC. When the paper feed lever is pressed down, (14) and (15) are on, IC700-2 turns on, TR702~703 turn off regardless of the REC status, TR705 turns on and the motor runs.

Running Out of Paper

When the thermal head is not set or the paper is used up (or not loaded), a message is displayed on the CRT and the recording is stopped.

The micro-switch SS-5GL2 opens/closes together with the head. When the head is set to the recording position, the switch closes. The photo-reflector in UP-7644 senses the paper status. When the paper is loaded and the head is set, the light is reflected with the paper and the output NOPAPER becomes low. The NOPAPER is sent to the host CPU.

Power Supply


IC701
78M05
+12V
CNJ 706
H60-12-30-114
C714 0.1μ
C716 4.7μ
C715 0.1μ
+12V REC
+12V
C712 22μ
IC704
741C
R724 2.2K
VR701 2K
R723 3.3K
ER
ER
CNP607
CRT BOARD
TP701
IC703 78L05
D705 1S953
+5V
C705 15000μ
C704 1000P
R728 10K
CNJ 710
HKP-20M2-10BT
ER
ER
ER
ER
TP E
ER
+9V
+9V
+9V
+9V
ED
CNP 710
TO THERMAL HEA
+5V
C713 47μ
L701 100μH
+5V
ENB
CLK
STB
SIN
SOUT
ED
+5V
ENB
CLK
STB
SIN
SOUT

A regulated voltage of +9 and +5 is supplied from +12V. Although IC701 itself is a regulator for +5V, IC704 boosts the common potential of IC701 to provide +9V. As the current capacity of IC701 is not enough for driving all heat elements, C705 supplies the current. To avoid a malfunction caused by charged C705 when the power is turned off, +5V is turned off after +9V is turned off by connecting IC703 to the output of IC701. The data and control signals for the thermal head are transferred from the host CPU to the head through this board.

3-7 Power Unit SC-701V

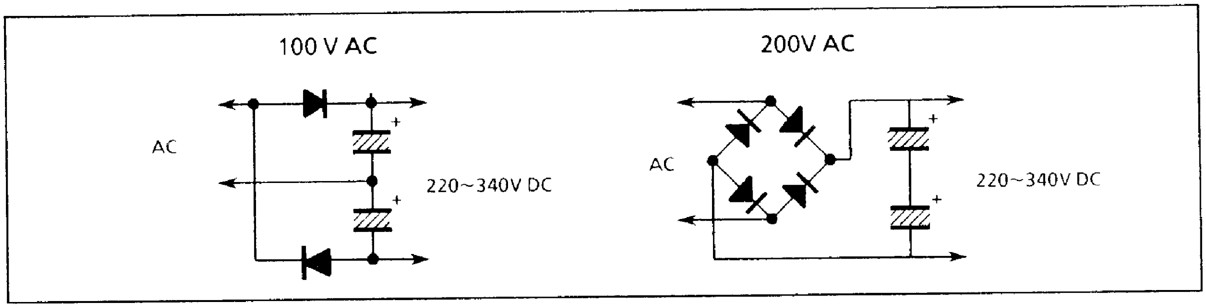
Outline

The switching regulator supplies the DC power to each unit from the AC source or the battery. The battery charger controls the charging voltage in the cycle or trickle mode.

AC Power Supply

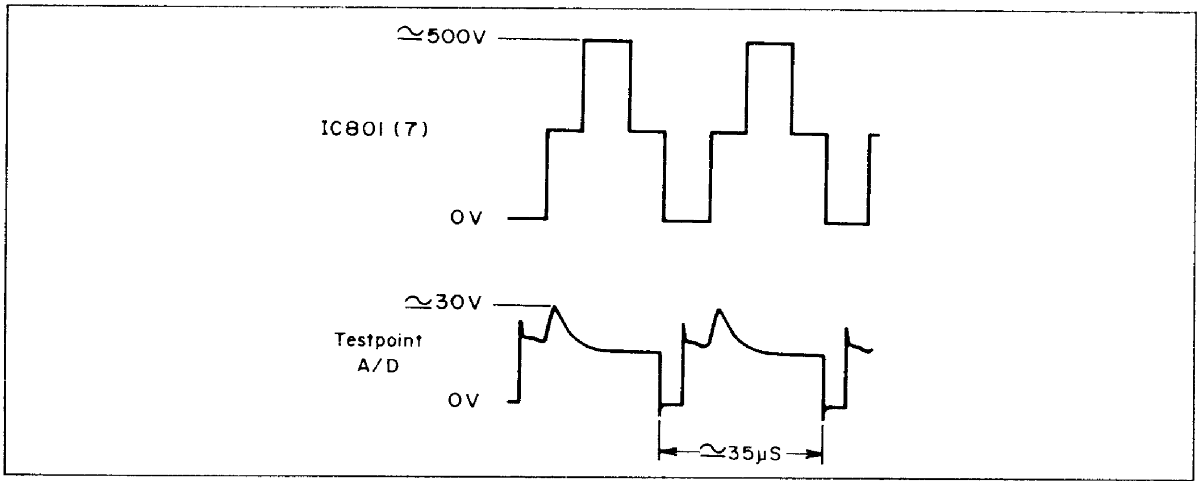
The line filter CN801, L801~802 and C801~802 prevent the switching noise from interfering with external instruments connected to the AC line. The thermistor TH801~802 protects the circuit from a rush current. When the power is turned on, the impedance of the thermistors is high to impede a rush current. In steady state, the impedance decreases due to the temperature increase. The selector P802 and J802~803 select the voltage of the AC power source of 100V (90~135V) and 200V (180~265V). In 100V position, the circuit becomes the voltage doubler rectifier. In 200V position, the circuit becomes the bridge rectifier as shown below.

Rectifier Selection



AC/DC Switching Control

The switching regulator IC801 is powered by Q801 to initiate an oscillation when the power is turned on and by T801 through D807~808 in steady state. IC801 switches Q804~805 and Q802~803 alternately to chop the power supply voltage which appears across C803 and C804 in the half-bridge method. The output voltage is regulated by PWM method by the feedback voltage to IC801 (12). When IC801 (7) is low, Q805 turns on, Q803 turns on through T804, the voltage across C804 is chopped and the pulses are transferred to the secondary winding circuit through T801.



Relay Control

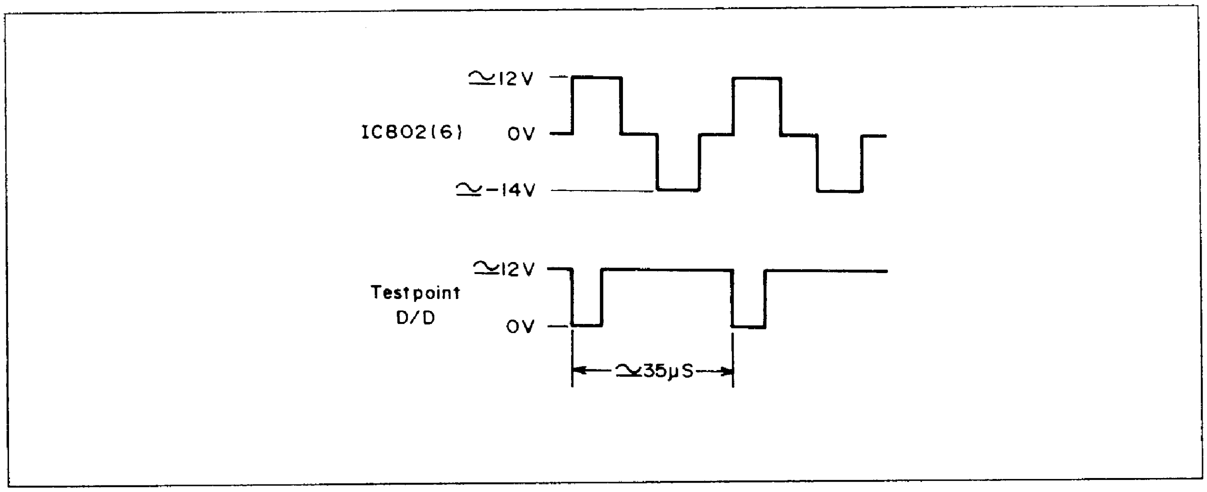
RY801 selects the power source of AC or the battery. RY802 turns on/off the power. When the AC source is available, the anode of D810 is high, Q806 turns on and the AC is selected. The signal AC of J804 (18) also becomes high and is sent to the host CPU. When the signal AC is low, +12VB of J804 (19) is A/D converted and monitored as the battery level by the host CPU. When the battery's level is lower than the operating voltage, the host CPU makes the BATOFF of J804 (17) high. RY802 is controlled by the POWER (from the energy selector), BATOFF, and AC of IC803 (12). The logic for RY802 is shown below.

Power on/off and AC/Battery Relay Control

POWER J804 (20)	1	0	0	0	0	0: Power on
IC803 (12)	X	0	0	1	1	1: AC is available
BATOFF J804 (17)	X	1	0	0	1	1: Battery is off
AC/BAT selector RY801	BAT	BAT	BAT	AC	AC	-----
Power on/off RY802	OFF	OFF	ON	ON	ON	-----

DC/DC Switching Control

Q807~808 switched by IC802 chops the rectified voltage. The pulse width of the chopped waveform regulates the output voltage by a feedback of +5V to IC802 (12). When the power on/off relay closes, the power is supplied through D815 to IC802 and an oscillation starts. Pulses transferred through T802 are rectified to provide ±6V, ±8.5V, +5V, +12VREC, +12VCRT and+12VB. ±6V and +12VCRT are regulated by series regulators IC807~809 and +5V is regulated by a switching regulator IC802.

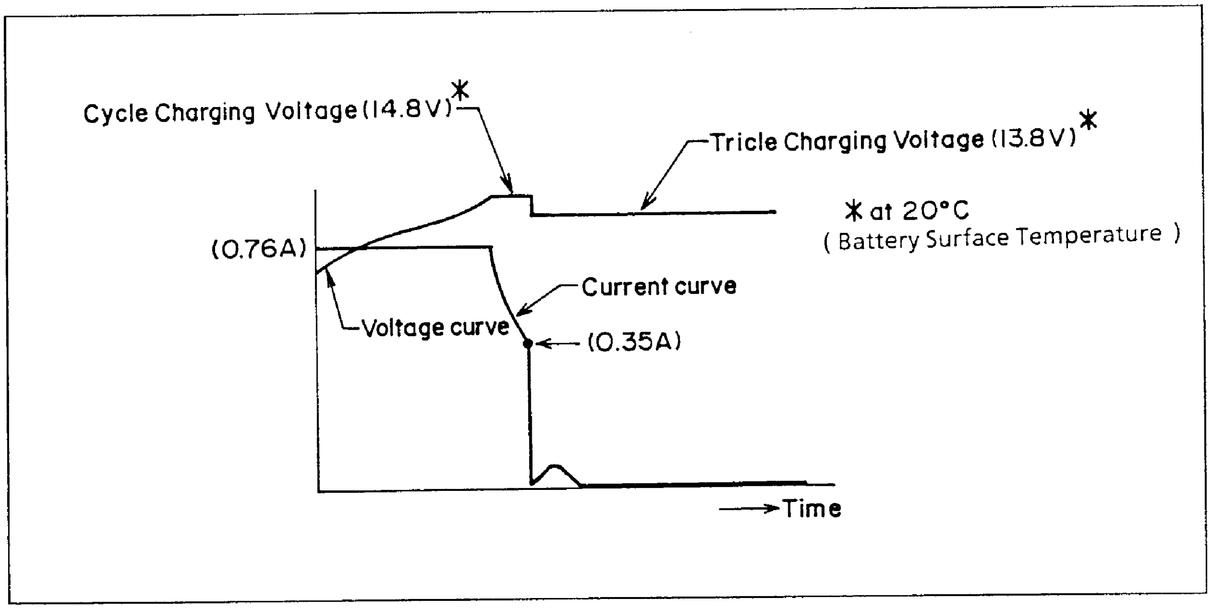


Battery Charger

The charger controls the charging mode of cycle and trickle. In the cycle mode, a large charging current rapidly charges the battery. When the battery is fully charged, the charging current is reduced to the minimum level to keep the battery fully charged.

The voltage regulator IC805 regulates the battery voltage in two steps. When charging starts (cycle mode), the regulation level is set to 14.8V (20°C). IC805 supplies a limited current of 760 mA to increase the voltage. The voltage across R849 is sensed by IC805 (2) and (3) to monitor the current level. When the battery level becomes the regulation level of 14.8V, the level is sensed by (4), the voltage is regulated and the charging current decreases gradually. When the charging current decreases to 350 mA, IC806 provides a low output to IC805 (5) to change the regulation level to 13.8V (20°C) and the current decreases to several mA for trickle charging. The regulation voltage depends on the battery surface temperature. The voltage in the tricle mode is 14.1V at 0°C, 13.8V at 20°C and 13.4V at 40°C.

Battery Charging Characteristics



Battery Charge Indication

(UP-7640)

When the AC power is supplied, the AC power switch is turned on, and the battery is in place in the defibrillator, the BATTERY lamp lights. The battery presence is detected by the switch connected to connector J808.

(UP-7720/7720G)

The BATTERY lamp lights in the cycle charge mode and goes off in the trickle mode. The lamp also goes off when the battery is not charged. The comparator IC10 monitors the battery charging current by the voltage across R884. When the charging current becomes less than approx. 25mA, the lamp goes off.

Section 4 SELF-CHECK

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4-2 Error 1 .... 4.2
4-3 Error 2, 3 .... 4.3
4-4 Error 4 .... 4.4

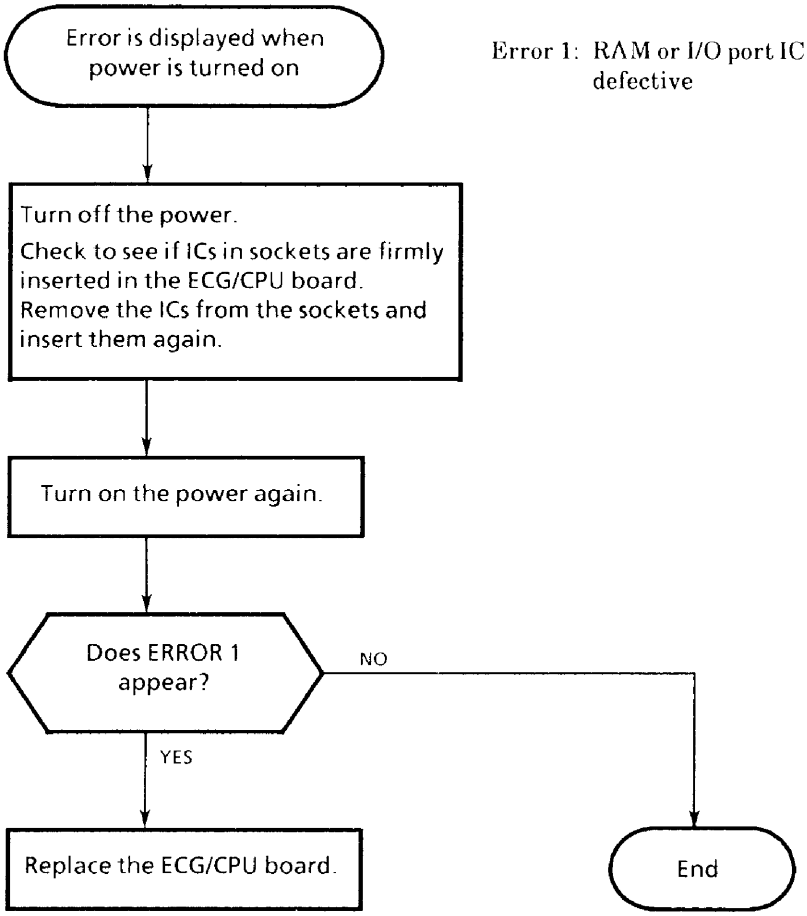
4-1 Introduction

The host CPU monitors the circuit operation and displays an error code on the screen when a malfunction is found according to the self-check program. Four types of error codes are provided.

When the power is turned on, RAMs and the I/O port are checked. If a malfunction is found, "ERROR 1" is displayed with an alarm for 3 sec. If no trouble is found "READY" is displayed.

When the high voltage circuit is faulty, error 2, 3 or 4 is displayed and the CPU inhibits the energy charging operation for safety. These error messages are stored in the memory of the timer IC, which is backed up by the battery. Therefore, once the message appears, charging is impossible even after the power is turned off and on again. However, this error message may appear due to noise or poor contact of the connector. First clear the error message in the memory as shown in later to eliminate such faulty error messages.

4-2 Error 1

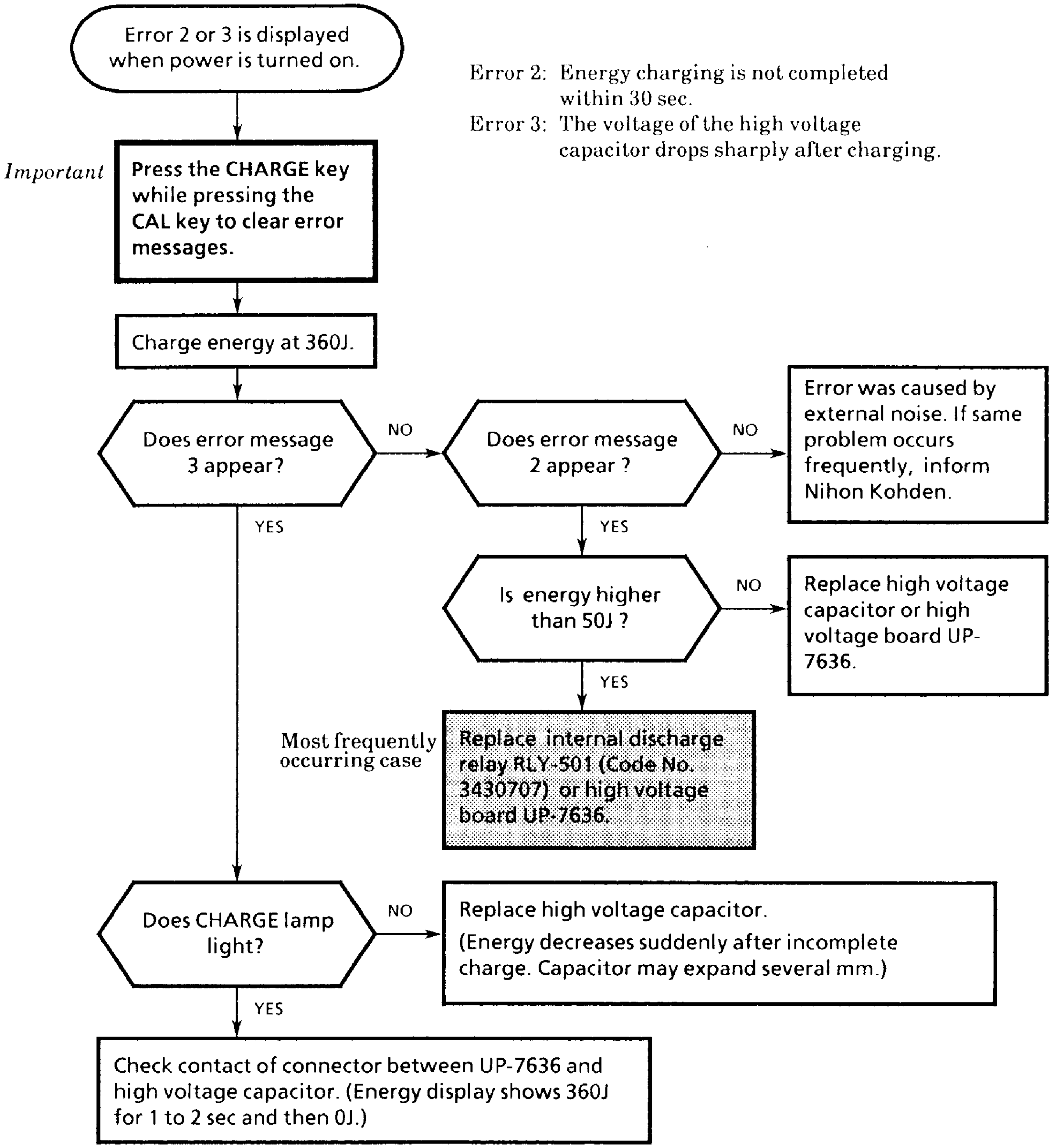

Error is displayed when power is turned on
Turn off the power.
Check to see if ICs in sockets are firmly inserted in the ECG/CPU board.
Remove the ICs from the sockets and insert them again.
Turn on the power again.
Does ERROR 1 appear?
NO
YES
Replace the ECG/CPU board.
End

Error 1: RAM or I/O port IC is defective

4-3 Error 2, 3

Error 2: Energy charging is not completed within 30 sec.

Error 3: The voltage of the high voltage capacitor drops sharply after charging.



Error 2 or 3 is displayed when power is turned on.

Important

Press the CHARGE key while pressing the CAL key to clear error messages.

Charge energy at 360J.

Does error message 3 appear?

Does error message 2 appear ?

Error was caused by external noise. If same problem occurs frequently, inform Nihon Kohden.

Is energy higher than 50J ?

Replace high voltage capacitor or high voltage board UP-7636.

Most frequently occurring case

Replace internal discharge relay RLY-501 (Code No. 3430707) or high voltage board UP-7636.

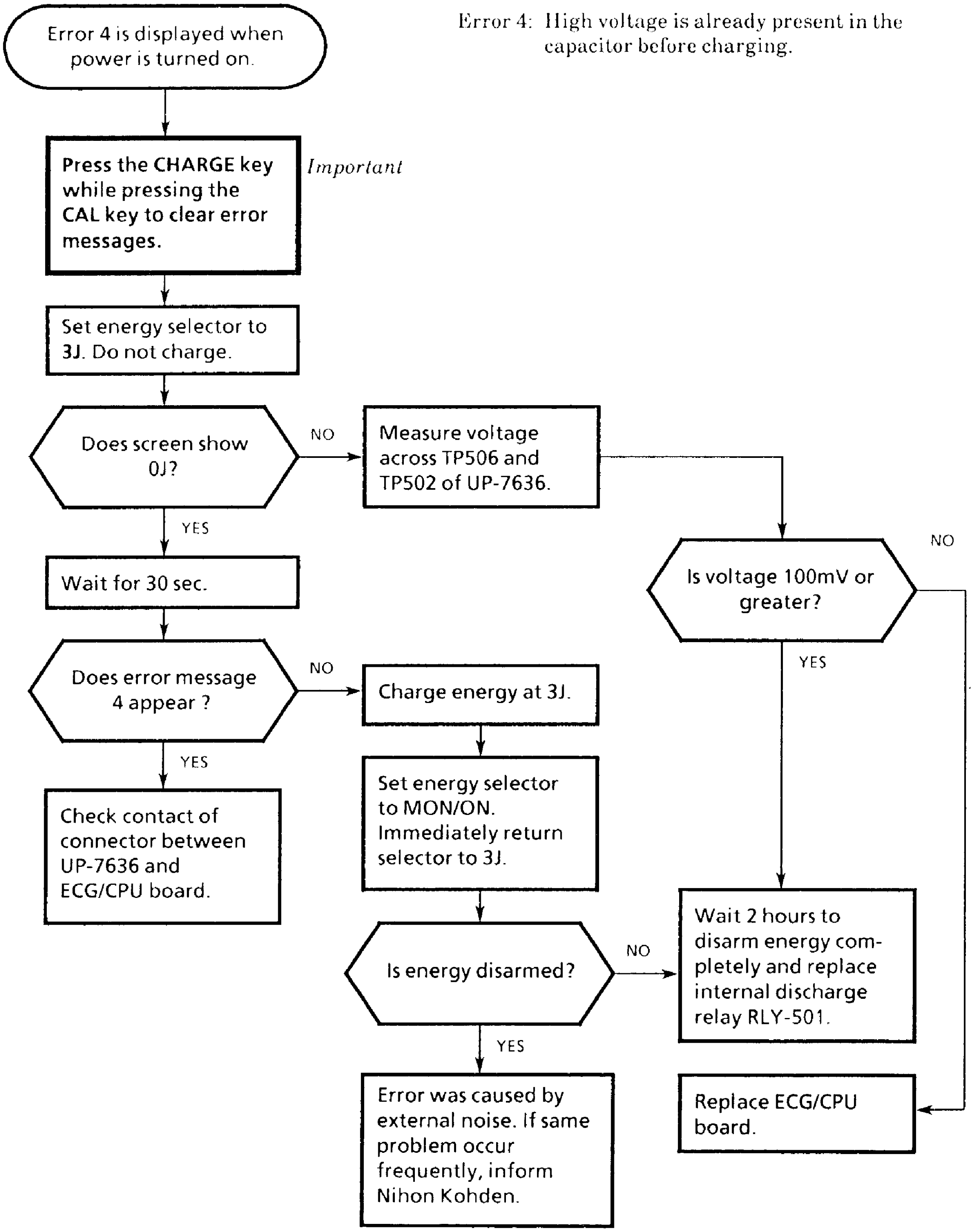
Does CHARGE lamp light?

Replace high voltage capacitor. (Energy decreases suddenly after incomplete charge. Capacitor may expand several mm.)

Check contact of connector between UP-7636 and high voltage capacitor. (Energy display shows 360J for 1 to 2 sec and then 0J.)

4-4 Error 4

Error 4: High voltage is already present in the capacitor before charging.


Error 4 is displayed when power is turned on.
Press the CHARGE key while pressing the CAL key to clear error messages.
Important
Set energy selector to 3J. Do not charge.
Does screen show 0J?
NO
Measure voltage across TP506 and TP502 of UP-7636.
YES
Wait for 30 sec.
Is voltage 100mV or greater?
NO
YES
Does error message 4 appear ?
NO
Charge energy at 3J.
YES
Check contact of connector between UP-7636 and ECG/CPU board.
Set energy selector to MON/ON. Immediately return selector to 3J.
Is energy disarmed?
NO
Wait 2 hours to disarm energy completely and replace internal discharge relay RLY-501.
YES
Error was caused by external noise. If same problem occur frequently, inform Nihon Kohden.
Replace ECG/CPU board.

Section 5 ADJUSTMENTS

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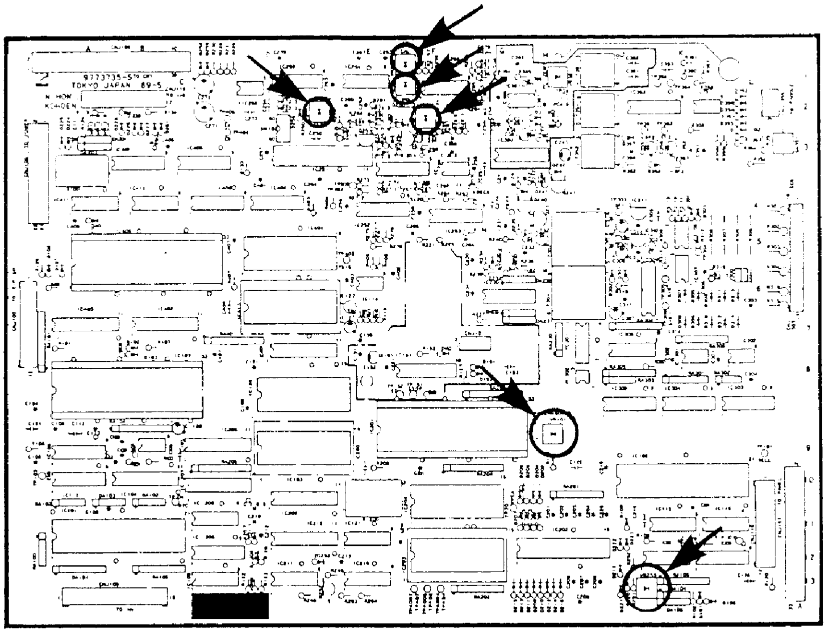
5-1 ECG / CPU Board UP-7635/76351/7737



When replacing the CPU board, no adjustment is required as it has already been adjusted at the factory.

5-1-1 Charging Completion Sound Volume

Adjustment

Charge the energy at 3J and adjust VR101 as follows.

Preset control	Sound
VR101 (HR SOUND)	Maximum

5-1-2 Reference Voltage

Preparation

1. Set ENERGY SELECT switch to "ECG MON POWER ON" position.

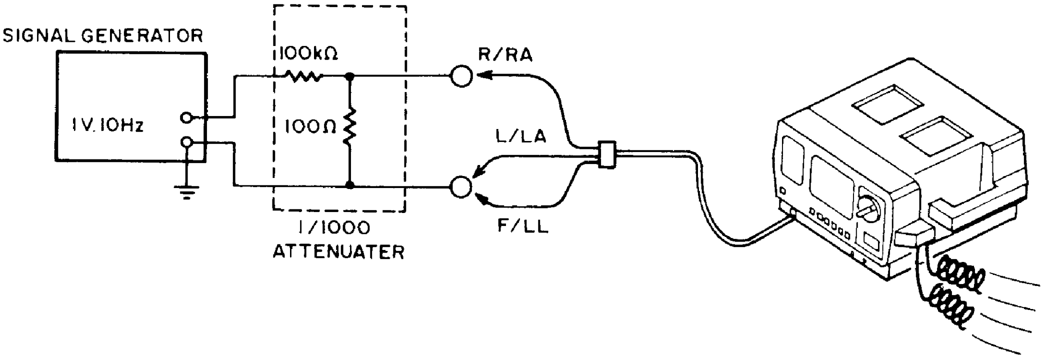
Adjustment

Preset control	Measuring point	Adjustment range
VR252 (REF4V)	TPREF	+ 4 ± 0.001V

5-1-3 ECG Amplifier Gain

Preparation

1. Input the sine wave of 10Hz/1mV p-p divided into 1/1000 of 1 Vp-p to the ECG input leads.
2. Select ECG LEAD (I) and sensitivity (× 1).


SIGNAL GENERATOR
1V. 10Hz
100kΩ
100Ω
1/1000
ATTENUATER
R/RA
L/LA
F/LL

Adjustment

Preset control	Adjustment
VR251 (GAIN)	10 mmp-p on paper

5-1-4 Amplitude of Calibration Waveform

This adjustment should be carried out after completing item 5-1-2.

Preparation

Select × 1 by pressing SENS switch.

Adjustment

Press the CAL button located on the front panel.

Preset control	Adjustment
VR253 (CAL)	10 mm p-p on paper

5-1-5 Amplitude of Test Signal

Preparation

1. Select TEST mode by LEAD switch.
2. Select × 1 by pressing SENS switch.

Adjustment

This adjustment should be carried out after completing item 5-1-2.

Preset control	Adjustment
VR254 (TEST)	10 mm p-p on paper

5-1-6 Paddle Contact Indicator

Preparation

Apply the resistor of the value as shown below between paddle electrodes.

Adjustment

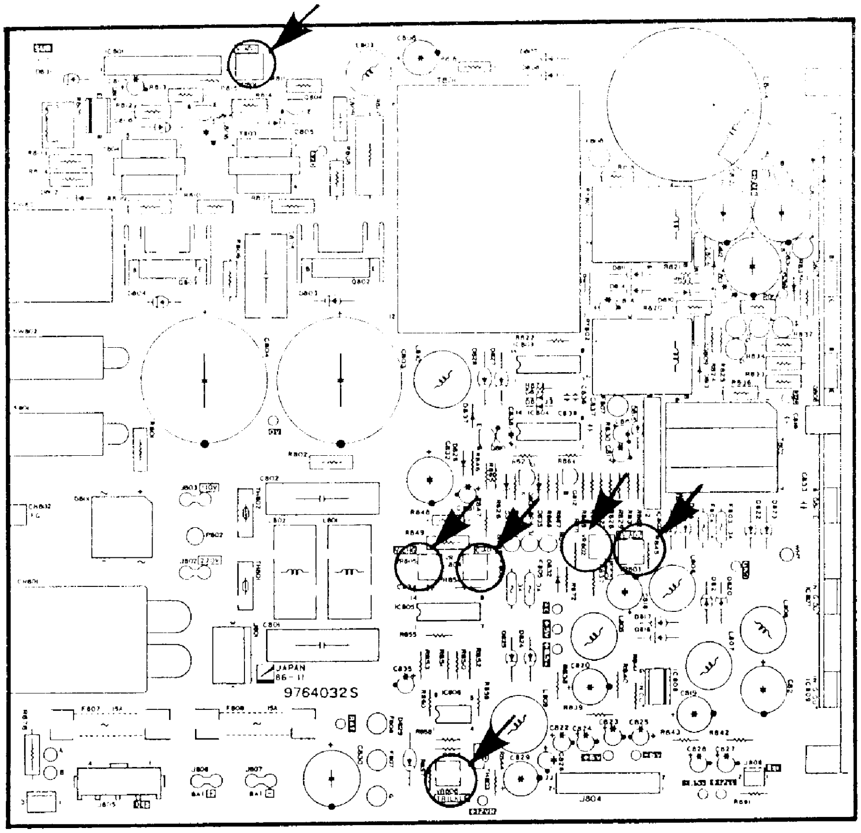
Preset control	Color of paddle contact indicator
VR381 (PC ZERO)	Threshold level of Green and Yellow (100Ω resistor) Threshold level of Yellow and Red (200Ω resistor)

5-1-7 Battery Level Indicator

Adjustment

Preset control	Measuring point	Adjustment
VR525	IC202 pin-28	Voltage at CNJ108 pin-19 × 0.2

5-2 Switching Regulator UP-7640/7720



When changing the switching regulator board, readjustments of VRs are not required.

CAUTION

1. *Do not touch AC primary circuit with one's hand.*
2. *When testing AC primary circuit by the oscilloscope, a power supply isolated from AC line voltage is required.*
3. *Do not use the test terminal 0V to check all of the secondary circuits, because this 0V terminal is applied to the SC line voltage directly. This 0V test terminal must be used for checking the AC primary circuit only.*

5-2-1 Power Supply Voltage + 12 VB

DC +12 VB is mainly used for high voltage circuits. This power supply is output from the AC-DC inverter circuit of this unit.

Preparation

Set the ENERGY SELECT dial to "360J" position.

Adjustment

Press the CHARGE key. After charging is completed, adjust VR801.

Preset control	Measuring point	Adjustment range
VR801 (V.ADJ)	TP + 12VB	+ 12 ± 0.1 V

5-2-2 Power Supply Voltage + 5V

+5VDC output from DC-DC converter is used for the digital circuit.

Preparation

When adjusting the to +5V, the output current load is required. Set the ENERGY SELECT switch to ECG MON POWER ON position to provide DC+5V power supply with the proper current load during adjustment. The 15Ω / 2W resistance also provides the equivalent current load for this power supply.

Adjustment

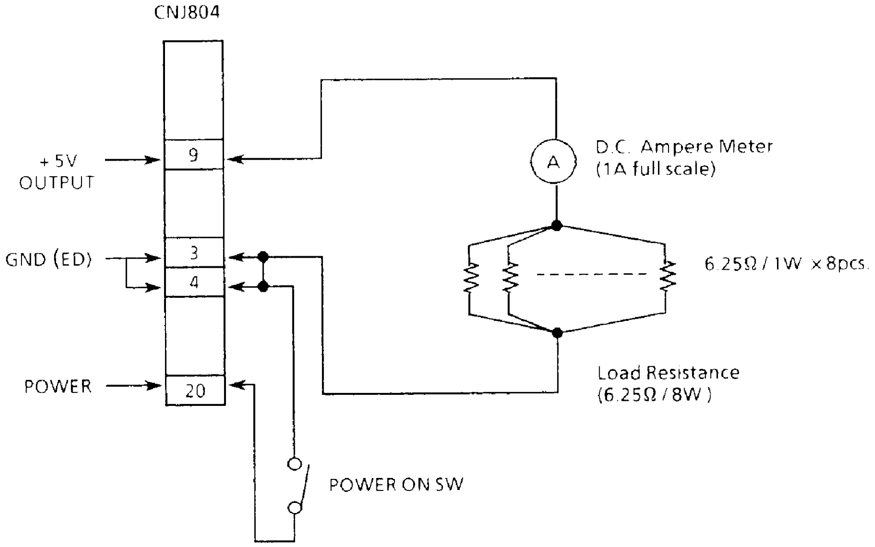
Preset control	Measuring point	Adjustment range
VR803 (5V ADJ)	TP + 5V	+ 5.03 ± 0.05 V

5-2-3 + 5V Current Limiter

When excessive current is loaded to the +5V power supply due to some circut troubles, the output current is limited with 800mA.

Preparation

1. Disconnect connector CNP108 from the P.C.B. (UP-7640).
2. Connect the load resistor and D.C. ampere meter between pin number ⑨ (+5V) and ③, ④ (GND) of CNJ804 as shown below.
3. Connect the power switch between ③, ④ and ⑳ as shown below.


CNJ804
+5V OUTPUT
GND (ED)
POWER
9
3
4
20
A
D.C. Ampere Meter
(1A full scale)
6.25Ω / 1W × 8pcs.
Load Resistance
(6.25Ω / 8W)
POWER ON SW

The load resistance can be equally provided by using the eight resistors of 50Ω / 1W instead of the one resistor of 6.25Ω / 8W.

Adjustment

Adjust the VR802 so that an ampere meter indicates 800mA.

Preset control	Measuring point	Adjustment value
VR802 (OCP)	See Fig.	800mA

5-2-4 Trickle Charging Voltage

Battery charging circuit has two charging modes. Charging voltages are independently provided to each mode. It is only necessary to adjust the trickle charging voltage according to the following procedures.

Preparation

1. Remove the top casing.
2. Remove the power unit shield cover.
3. Use the fully charged battery when adjusting the trickle charging voltage.

Adjustment

The voltage depends on the ambient temperature.

Preset control	Measuring point	Adjustment range
VR805 (V.CHG)	TPBAT	13.88 ± 0.01V *Ta = 25°C

*Ta = Ambient Temperature

5-2-5 Maximum Charging Current

It is necessary to adjust the maximum charging current according to the following procedures.

Test Circuit

Connect the D.V.M. between across the resister R849. The measuring current can be obtained by the following equation.

$$\text{Charging limit current} = \frac{\text{Indicated value of D.V.M.(V)}}{1\Omega}\ (\text{A})$$

Adjustment

During charging the battery, adjust VR804.

Preset control	Measuring point	Adjustment value
VR804 (C.ADJ)	Across R849	0.76 V

5-2-6 Current Change from Cycle Charge to Trickle Charge

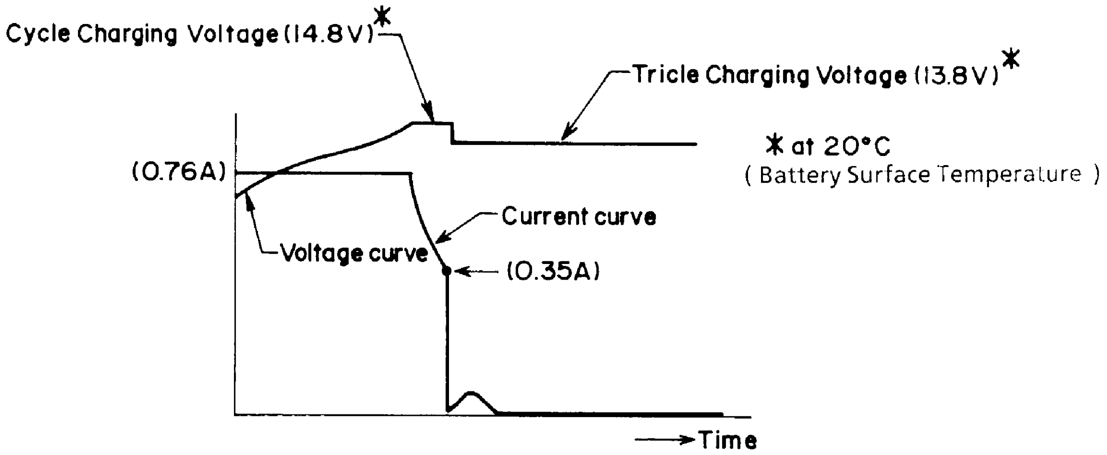
When a current of 0.35A is detected, the charging mode is changed from cycle mode to trickle mode as shown in the Fig. 5-2-5 and charging current is rapidly decreased.

Adjustment

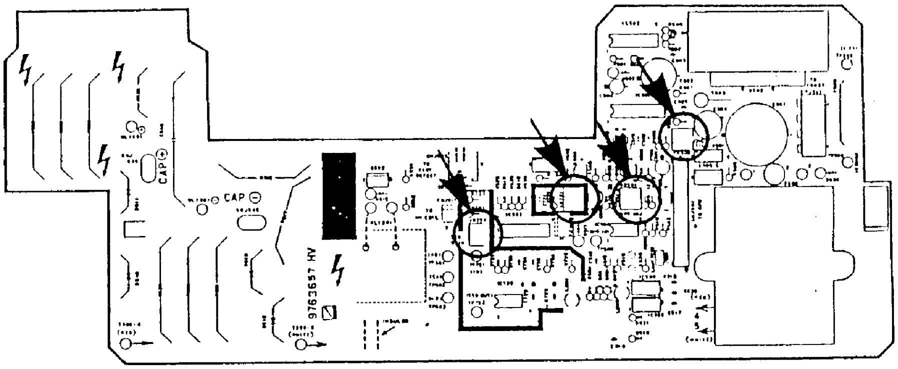
1. Charge the battery fully. An empty battery requires approx. 15 hours to charge completely.
2. Turn off the power by the AC POWER switch.
3. Turn on the power.
4. Monitor the voltage across R849. Constant voltage of 0.76V appears for a while, then the voltage starts decreasing gradually, if adjusted correctly. When the voltage becomes 0.35V, the voltage drops rapidly. If the voltage does not drop at 0.35V, repeat the procedure 2 and 3, adjust VR806, and monitor the voltage.

Preset control	Measuring point	Adjustment value
VR806 (TRICKLE)	Across R849	Constant at 0.76V Drops at 0.35V

Battery Charging Characteristics



5-3 High Voltage Board UP-7636/7851

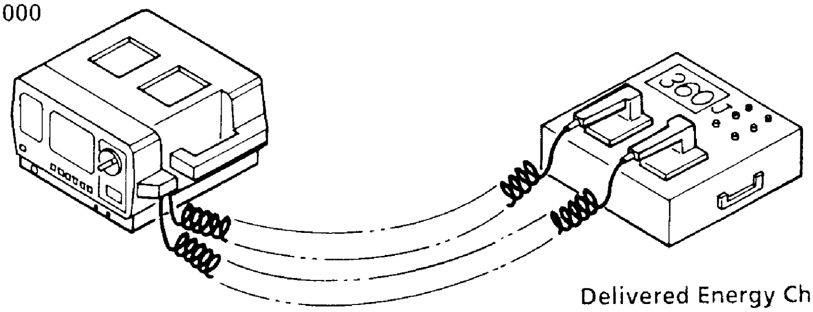

CAP⊕
CAP⊖
9763657 HV

The following adjustments are for the energy charge and discharge circuit of defibrillation.

5-3-1 Delivered Energy

Preparation

Connect the equipment as shown below.


TEC-7000
360J
Delivered Energy Checker

Adjustment Procedure

1. Select an energy of 360 J and charge the energy.
2. Press discharge buttons to deliver the energy to the checker.
3. If the checker does not show 360 J ± 10%, adjust VR501 and repeat the above procedures.
4. Confirm that the values of other energy levels are in the following range. If not, adjust VR501 so that the checker shows 1 ~ 2 J over the previous level of 360 J.

Selected Energy Level (J)	Delivered Energy Joule Meter	
	TEC-7100/7200/7300A	Other than TEC-7100/7200/7300A
3	3 J ± 1 J	3 J ± 1 J
5	5 J ± 2 J	5 J ± 2 J
10	10 J ± 2 J	10 J ± 2 J
20	20 J ± 10 %	20 J ± 15 %
30	30 J ± 10 %	30 J ± 15 %
50	50 J ± 10 %	50 J ± 15 %
70	70 J ± 10 %	70 J ± 15 %
100	100 J ± 10 %	100 J ± 15 %
150	150 J ± 10 %	150 J ± 15 %
200	200 J ± 10 %	200 J ± 15 %
300	300 J ± 10 %	300 J ± 15 %
360	360 J ± 10 %	360 J ± 15 %

5-3-2 Energy Charging Time

Adjustment

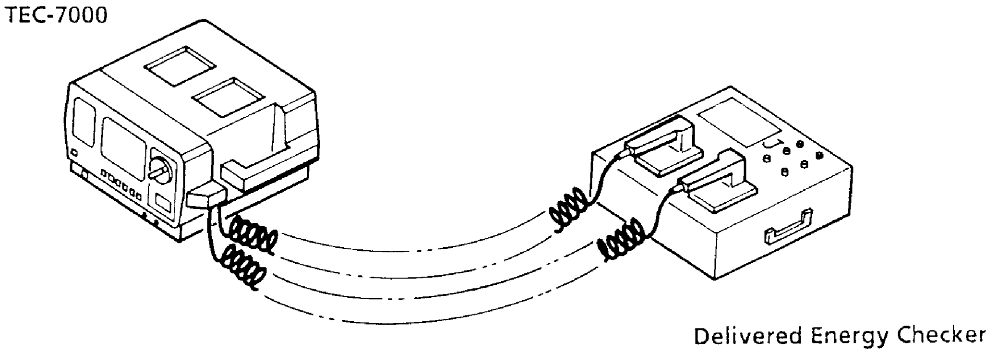
1. Operate the equipment on the AC line.
2. Select an energy of 360 J and charge the energy.
3. If charging time (after pressing the charge button until charging is completed) is out of 9.3~9.7 sec., adjust VR500 and repeat the above procedure.

Preset control	Adjustment range
VR500 (CHG TIME)	9.3 ~ 9.7 sec

5-3-3 TTR Gain (TEC-7200/7300)

Preparation

Connect the equipment as shown below.



Adjustment

1. TEC-7200
   (1) Press the HI / LO LIMITS key while pressing the ↑ key.
   (2) Press REC / STOP key while pressing the ↑ key.
   The TTR and delivered energy level will then be displayed on the heart rate position and set energy position, respectively.
   TEC-7300
   Press both CAL and FREEZE key simultaneously.
   The TTR and delivered energy level will then be displayed on the heart rate position and set energy position, respectively.
2. Select an energy of 50 J and charge the energy.
3. Press discharge buttons to deliver the energy to the checker.
4. If the displayed TTR is not 50 ± 1 Ω, adjust VR720 and repeat procedures 3 and 4.

Preset control	Adjustment range
VR720 (TTR GAIN)	50 ± 1Ω on CRT

5-3-4 Delivered Energy Display (TEC-7200/7300)

Preparation

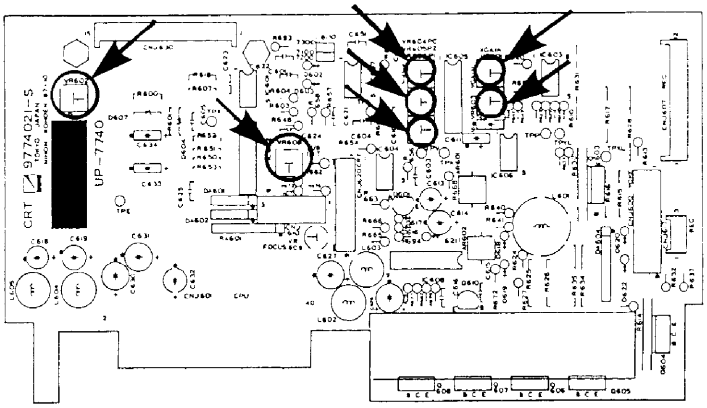
Connect the equipment as shown in Fig. 5-3-3.

Adjustment

1. TEC-7200
   (1) Press the HI / LO LIMITS key while pressing the ↑ key.
   (2) Press REC / STOP key while pressing the ↑ key.
   The TTR and delivered energy level will then be displayed on the heart rate position and set energy position, respectively.
   TEC-7300
   Press both CAL and FREEZE key simultaneously.
   The TTR and delivered energy level will then be displayed on the heart rate position and set energy position, respectively.
2. Select an energy of 50 J and charge the energy.
3. Press discharge buttons to deliver the energy to the checker.
4. If the displayed energy is not 50 ± 1J, adjust VR721 and repeat procedures 3 and 4.

Preset control	Adjustment range
VR721 (TTR ENRG)	50 ± 1J on CRT

5-4 CRT Display Adjustment UP-7740

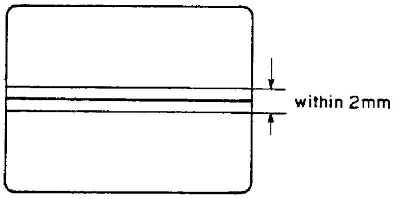

UP-7740
CRT 9774021-S

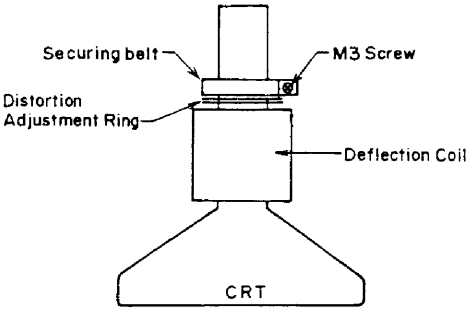
This adjustment is required when changing the deflection coil or the CRT tube. When changing each printed circuit board, this adjustment is not necessary.

5-4-1 Pattern Distortion and Sweep Rotation

Pattern Distortion Adjustment

1. Adjust the distortion adjustment ring mounted on the deflection coil so that the display pattern is placed on a specified position of the CRT screen. (See the following figure.)
2. Adjust the distortion adjustment ring so that no distortion occurs around the corner of the CRT screen.




Securing belt
M3 Screw
Distortion Adjustment Ring
Deflection Coil
CRT

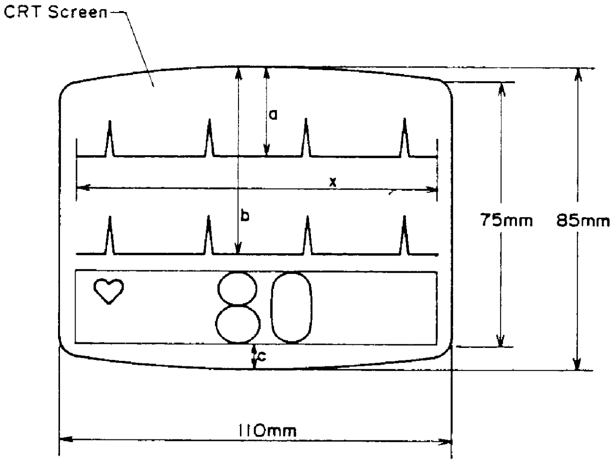
Sweep Rotation Adjustment

1. Loosen the M3 screw mounted on the securing belt.
2. Turn the deflection coil so that a sweep is positioned within a specified area.
3. Secure the M3 screw to fix the deflection coil.

5-4-2 Waveform and Character Position

Adjustment

1. Display the TEST wave by selecting TEST mode.
2. According to the adjustment table described below, adjust the position of the waves and the characters. The symbols, a,b,c and x used in the table are specified as shown below.



Item	Preset control	Adjustment
Sweep Length	VR601 (XGAIN)	X : 102 ± 5 mm
Sweep Horizontal Position	VR602 (X P)	Center of CRT Screen
Character Displat Position	VR604 (PC)	c : 7 ± 1 mm
Trace 2 Veritcal Position	VR605 (P2)	b : 48 ± 1 mm
Trace 1 Vertical Position	VR606 (P1)	a : 25 ± 1 mm
Signal Amplitude on CRT Screen *	VR603 (YGAIN)	10 ± 1 mm on the CRT screen

*Test Circuit

Input the signal of 1 mV / 10Hz to the ECG input cable as shown in Fig. 5-1-2 after confirming the gain of the ECG amplifier is adjusted.

5-4-3 Sub Intensity

Adjustment

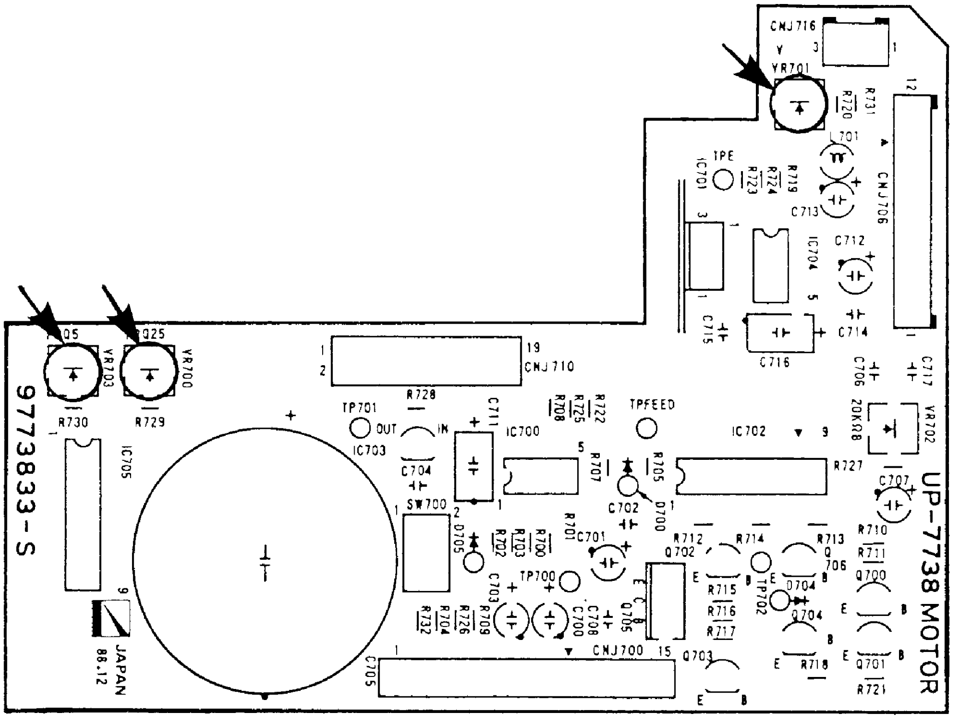
1. Turn the INTENSITY knob fully clockwise.
2. Adjust VR608 so that the raster disppears while the characters are displayed at maximum intensity.

5-4-4 Focus

Adjustment

1. Select the TEST waveform with the LEAD key.
2. Select the synchronized mode with the SYNC key.
3. Adjust VR609 so that the synchronized spot is displayed while characters are not out of focus.

5-5 Motor Control Board UP-7738


CNJ716
VR701
R720
R731
L701
TPE
IC701
R723
R724
R719
C713
CNJ706
IC704
C712
C715
C716
C714
C706
C717
Q5
Q25
VR703
VR700
CNJ710
R728
R730
R729
IC705
TP701
OUT
IN
IC703
C711
IC700
R708
R725
R722
TPFEED
IC702
20KΩB
VR702
R707
R705
R727
C704
SW700
D705
C702
D700
C707
R701
R702
R703
R700
C701
R712
R714
R713
Q702
Q706
R710
R711
Q700
TP700
C703
C708
C700
Q705
R715
R716
R717
TP702
D704
Q704
R732
R704
R726
R709
CNJ700
C705
Q703
R718
Q701
R721
97773833-S
JAPAN
88.12
UP-7738 MOTOR

5-5-1 Motor Rotation

Re-adjustment of this motor rotation is required only when changing the motor and not required when changing the PCB (UP-7648).

Adjustment

Press the REC/STOP key to start recording the test waveform, adjust the VR700 so that the interval between QRSs on the recording paper becomes 25 ±2 mm.

Preset control	Measuring point
VR700 (FREQ 25)	Interval between QRSs on paper: 25 ±2 mm
VR703 (FREQ 5) (TEC-7300 only)	Interval between QRSs on paper: 5 ±0.7 mm

5-5-2 Thermal Head Supply Voltage

CAUTION

Do not supply a voltage exceeding the specified head supply voltage to protect the thermal head element.

This adjustment is required when PCB of UP-7738 or the thermal head is replaced.

Adjustment

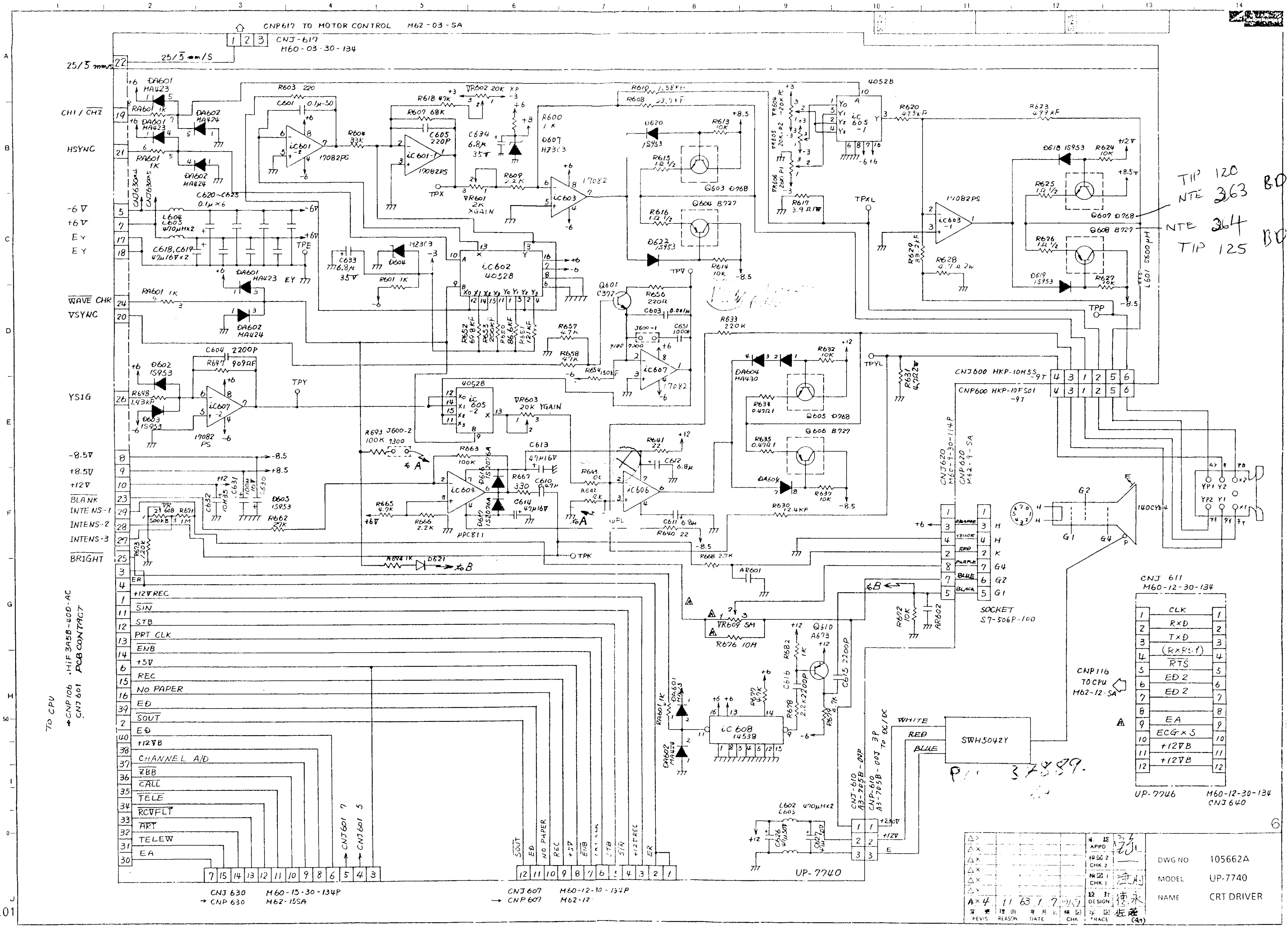
Adjust the VR701 so that the D.V.M. indicates the voltage shown in the following table.

The head resistance is indicated by the sticker attached on the thermal head.

Head resistance	Vth
132 ~ 139	7.9 ~ 8.0
140 ~ 149	8.0 ~ 8.2
150 ~ 159	8.2 ~ 8.4
160 ~ 169	8.4 ~ 8.6
170 ~ 179	8.6 ~ 8.8
180 ~ 189	8.8 ~ 9.0
190 ~ 199	9.0 ~ 9.1
200 ~ 209	9.1 ~ 9.3
210 ~ 219	9.3 ~ 9.5
220 ~ 229	9.5 ~ 9.7
230 ~ 239	9.7 ~ 9.8
240 ~ 249	9.8 ~ 10.0
250 ~ 260	10.0 ~ 10.2

Note: In TEC-7100/7200/7300C, increase the Vth by 1.1 times.
(Ex. 132~139 Ω: 8.7~ 8.8 V)

Preset control	Measuring point	Adjustment range
VR701 (V)	TP701	7.9 ~ 10.2 V (Vth)


CNP617 TO MOTOR CONTROL M62-03-SA
CNJ-617 M60-03-30-134
25/5 mm/S
CH1 / CH2
HSYNC
-6V
+6V
EY
EY
WAVE CHR
VSYNC
YSIG
-8.5V
+8.5V
+12V
BLANK
INTENS-1
INTENS-2
INTENS-3
BRIGHT
DA601 MA423
DA602 MA424
RA601 1K
C620~C625 0.1μ×6
L604 L603 470μH×2
C618, C619 47μ16V×2
iC601 17082PS
iC602 4052B
iC603 17082
iC605 4052B
iC606
iC607 17082PS
iC604 μPC811
iC608 14538
VR601 2K XGAIN
VR602 20K XP
VR603 20K YGAIN
VR609 5M
D607 HZ3C3
Q601 C397
Q603 D768
Q604 B727
Q605 D768
Q606 B727
Q607 D768
Q608 B727
Q610 A673
TPX
TPE
TPV
TPY
TPXL
TPYL
TPP
TPK
L601 5500μH
CNJ600 HKP-10H5S-9T
CNP600 HKP-10FS01-9T
CNJ620 M60-9-30-114P
CNP620 M62-9-SA
SOCKET S7-506P-100
140CY54
G1
G2
G4
YP1
YP2
X1
X2
Y1
Y2
CNJ 611 M60-12-30-134
CLK
RXD
TXD
(RXRDY)
RTS
ED2
EA
ECGXS
+12VB
UP-7746
M60-12-30-134 CNJ 640
CNP116 TO CPU M62-12-SA
SWH5042Y
WHITE
RED
BLUE
CNJ-610 A3-705B-00P
CNP-610 A3-705B-00J 3P TO DC/DC
L602 L605 470μH×2
UP-7740
TO CPU
CNP106 .HIF 3A5B-40D-AC
CNJ 601 PCB CONTACT
+12V REC
SIN
STB
PRT CLK
ENB
+5V
REC
NO PAPER
ED
SOUT
ED
+12VB
CHANNEL A/D
ZBB
CALL
TELE
RCVFLT
ART
TELEW
EA
CNJ601 7
CNJ601 5
CNJ 630 M60-15-30-134P
CNP 630 M62-15SA
CNJ607 M60-12-30-134P
CNP607 M62-12
TIP 120
NTE 263
BD6
NTE 264
TIP 125
BD6
P/N 37889

DWG NO	105662A	
MODEL	UP-7740	
NAME	CRT DRIVER	

00/7300.01

11.19

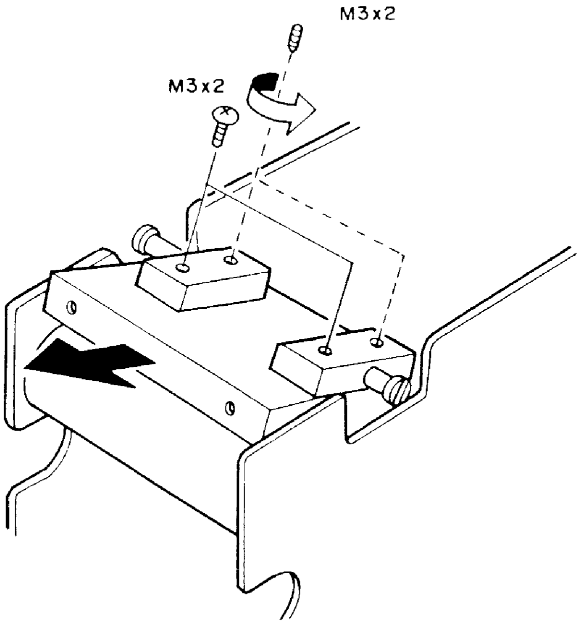
5-6 Thermal Head Replacement & Alignment

Thermal head supply voltage adjustment is required when the head is replaced.

5-6-1 Thermal Head Replacement

P/N: 1800063 ($481-32 +)
4/8/98

1. Remove the main unit's upper casing, as described in section 5-1.
2. Remove the recorder, as described in section 5-2.
3. Slightly loosen the two set-screws of the thermal head.
4. Remove the two screws securing the thermal head to the recording unit.
5. Remove the thermal head as shown below.
6. Replace the old thermal head with a new one, and do the opposite of steps 2. through 5. in reverse order.
7. Align the thermal head, as described in section 5-6-2.



5-6-2 Thermal Head Alignment

1. If the main unit's upper casing has yet to be removed, remove it referring to section 5-1.
2. Make a sample recording, and determine whether or not the density of the printing is even. If the density on the left side is light, turn the recorder on, and slightly turn the left set-screw clockwise until the density is even with the right side.
3. Replace the upper casing by doing the opposite of steps 1) through 3) in section 5-1 in reverse order.

Section 6 DISASSEMBLY

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6-3-2 High Voltage Board UP-7636/7851 .... 6.5

6-3-3 Internal Discharge Relay 6.5

6-4 Front Panel Assembly 6.6

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6-4-2 Front Panel Board UP-7638 .... 6.6

6-5 Paddle / Paddle Connector Receptacle 6.7

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6-5-2 Paddle Connector Receptacle (TEC-7200/7300) 6.7

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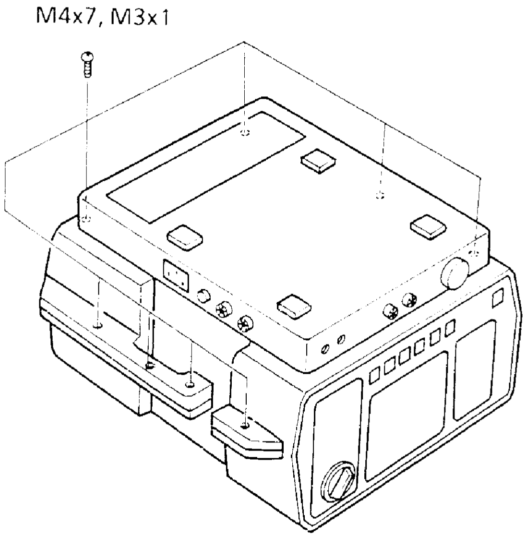
6-8 ECG /CPU Board UP-7635/76351/7737 .... 6.9

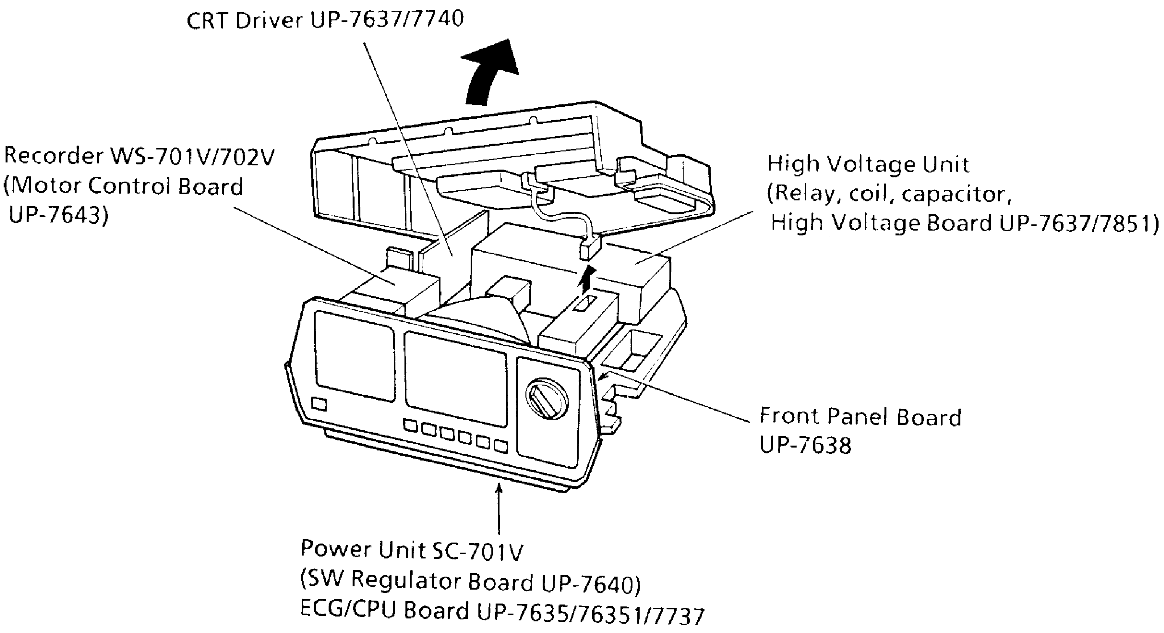
6-9 VR and Connector Board UP-7639 & ECG Input Connector 6.10

6-1 Upper Casing (Location of Units)

1. Remove the seven M4 and one M3 screws on the bottom of the main unit and handle.

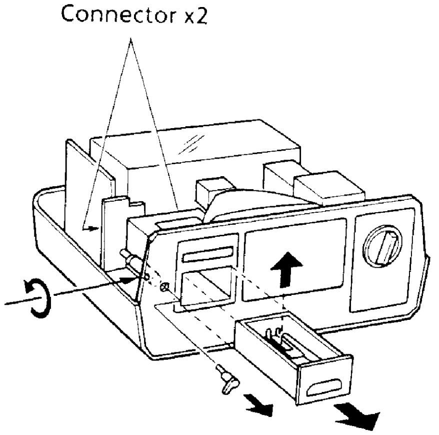


2. Placing the instrument right side up, lift up the upper casing, and disconect the connector.

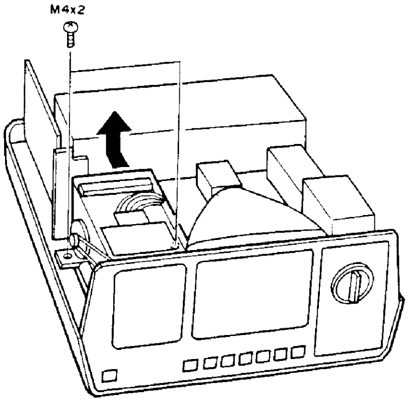

CRT Driver UP-7637/7740
Recorder WS-701V/702V
(Motor Control Board
UP-7643)
High Voltage Unit
(Relay, coil, capacitor,
High Voltage Board UP-7637/7851)
Front Panel Board
UP-7638
Power Unit SC-701V
(SW Regulator Board UP-7640)
ECG/CPU Board UP-7635/76351/7737

6-2 Recorder WS-701V/702V

1. Remove the upper casing as shown in section 6-1.
2. Take out the paper tray while pressing the stopper in the tray upward.
3. Loosen the M3 set-screw in the lever shaft using an allen wrench, and take out the lever.
4. Disconnect the two connectors.

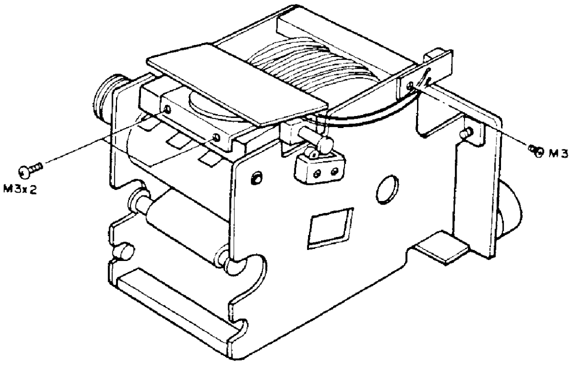


5. Remove the two M4 screws.
6. Pulling the recorder backward, lift it up.



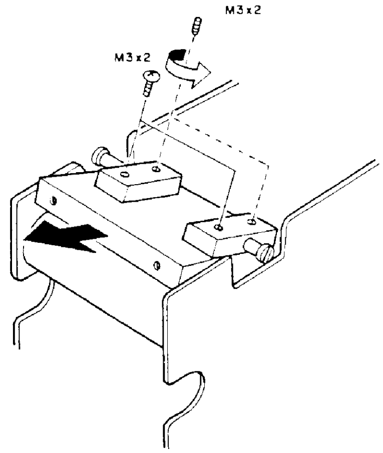
6-2-1 Speaker unit

7. Remove the three M3 screws.



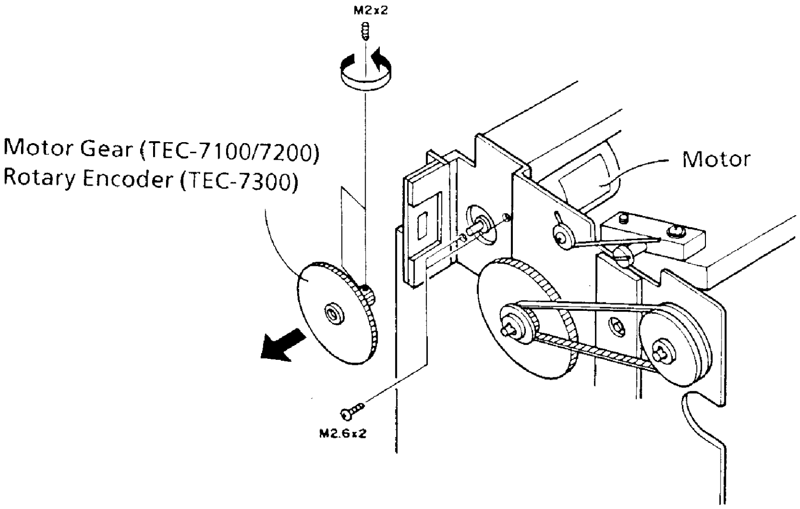
6-2-2 Thermal Head

7. Remove the speaker unit as shown in section 6-2-1.
8. Remove the two M3 screws.
9. Loosen the two M3 set-screws.



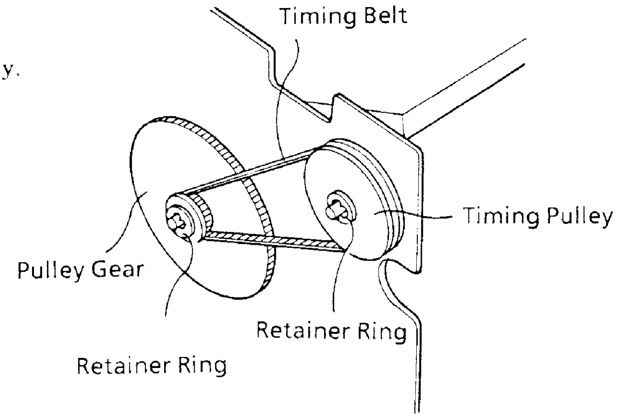
6-2-3 Motor

7. Remove the two set-screws.
8. Remove the gear assy.
9. Remove the two M2.6 screws.


M2x2
Motor Gear (TEC-7100/7200)
Rotary Encoder (TEC-7300)
Motor
M2.6x2

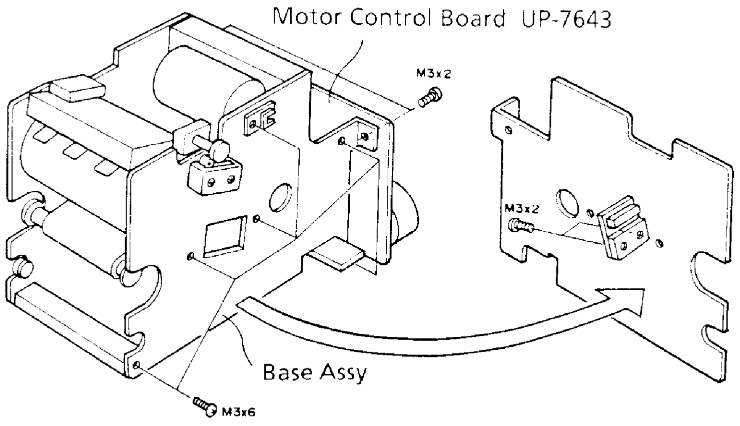
6-2-4 Timing Belt

7. Remove the two retainer rings.
8. Remove the pulley gear and timing pulley.


Timing Belt
Timing Pulley
Pulley Gear
Retainer Ring
Retainer Ring

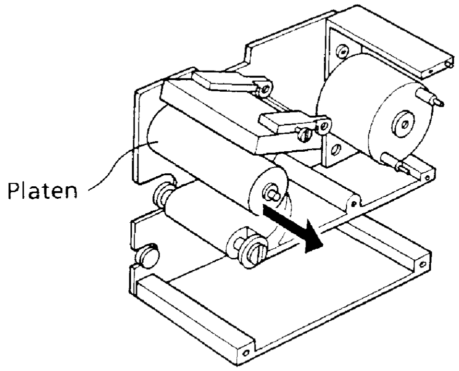
6-2-5 Photosensor

7. Remove the two M3 screws on the motor control board UP-7738.
8. Remove the six M3 screws on the side panel of the recorder.
9. Remove the two M3 screws on the photosensor behind the panel.


Motor Control Board UP-7643
M3x2
M3x2
Base Assy
M3x6

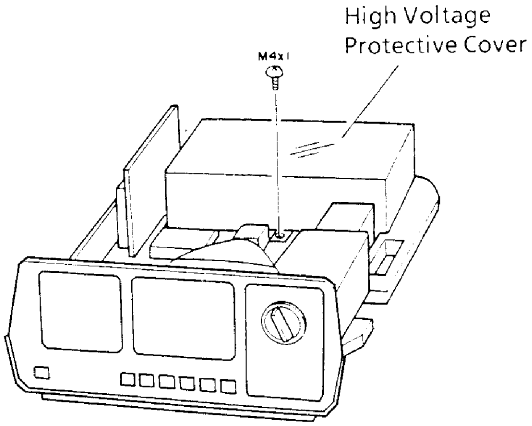
6-2-6 Platen

7. Remove the side panel of the recorder as shown in the step 7 and 8 of section 6-2-5.
8. Remove the motor gear and timing pulley as shown in section 6-2-4.



6-3 High Voltage Section

1. Remove the upper casing as shown in section 6-1.
2. Remove the M4 screw.
3. Lift up the cover.


M4x1
High Voltage Protective Cover

6-3-1 Energy Capacitor, Coil and External Discharge Relay

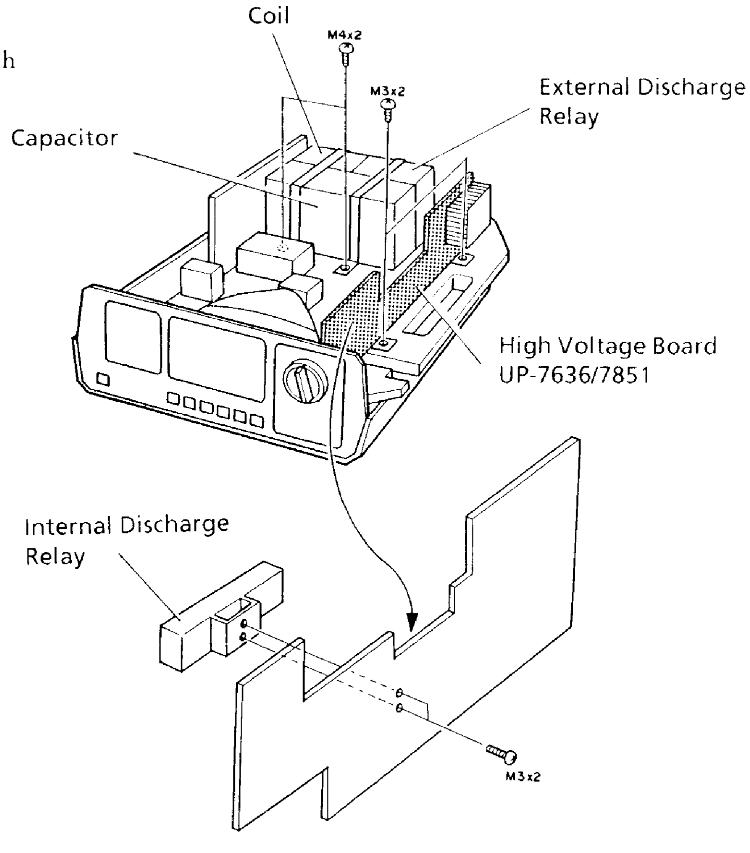
4. Remove the two M4 screws.
5. Loosen the securing belt.
6. Disconnect the connectors to remove each component.

6-3-2 High Voltage Board UP-7636/7851

4. Disconnect the connectors.
5. Remove the two M4 screws.
6. Lift up the board.

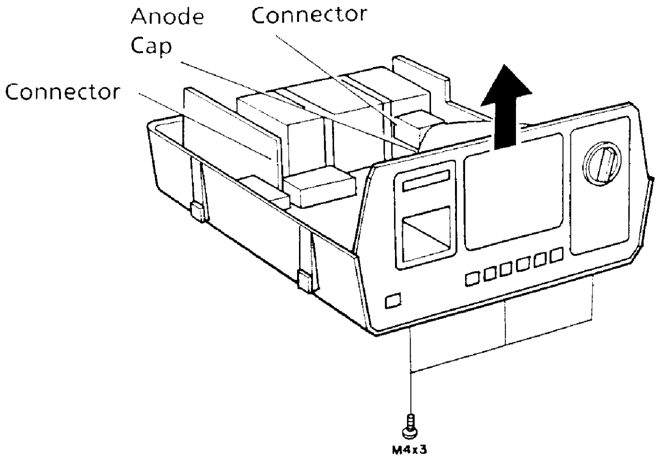
6-3-3 Internal Discharge Relay

4. Remove the high voltage board as shown in section 6-3-2.
5. Remove the two M3 screws.
6. Desolder the four leads.


Coil
M4x2
M3x2
External Discharge Relay
Capacitor
High Voltage Board UP-7636/7851
Internal Discharge Relay
M3x2

6-4 Front Panel Assembly

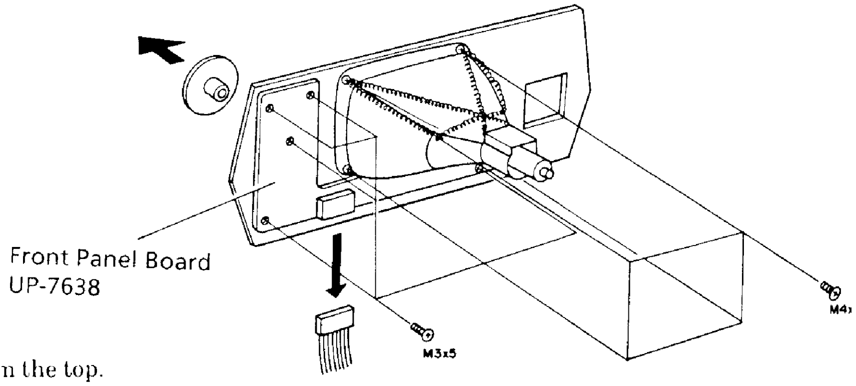
1. Remove the upper casing as shown in section 6-1.
2. Remove the recorder as shown in section 6-2.
3. Disconnect the two connectors and anode cap.
4. Remove the three M4 screws.
5. Lift up the assembly.



6-4-1 CRT

6. Remove the four M4 screws.

6-4-2 Front Panel Board UP-7638



6. Disconnect the connector.
7. Confirm that the energy selector is set to the OFF position.
8. Loosen the set-screw in the energy selector dial inserting an allen wrench from the top.
9. Set the energy selector to the 10J position.
10. Loosen the other set-screw in the same manner.
11. Remove the dial.
12. Remove the five M3 screws.

When setting the dial;

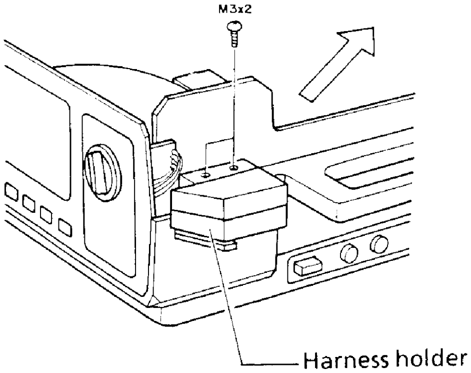
13. Rotate the shaft so that the flat cut plane of the shaft faces up.
14. Secure the set-screw so that the dial is set to the OFF position.
15. Set the energy selector to the 10J position and secure the other set-screw.

6-5 Paddle / Paddle Connector Receptacle

1. Remove the upper casing as shown in section 6-1.

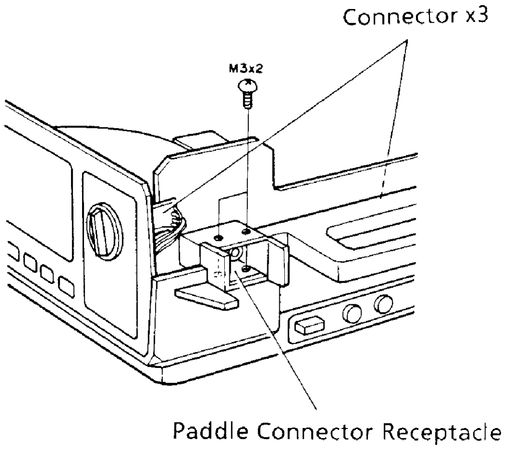
6-5-1 Paddle ND-701V (TEC-7100)

2. Remove the two M3 screws.
3. Disconnect the three connectors connected inside the instrument.
4. Remove the harness holder.


M3x2
Harness holder

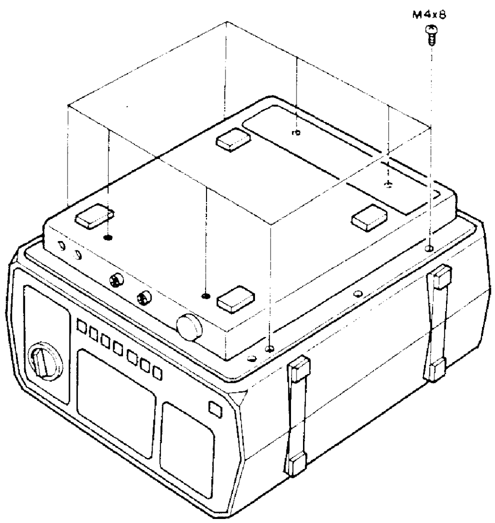
6-5-2 Paddle Connector Receptacle (TEC-7200/7300)

2. Disconnect the three connectors connected inside the instrument.
3. Remove the two M3 screws.

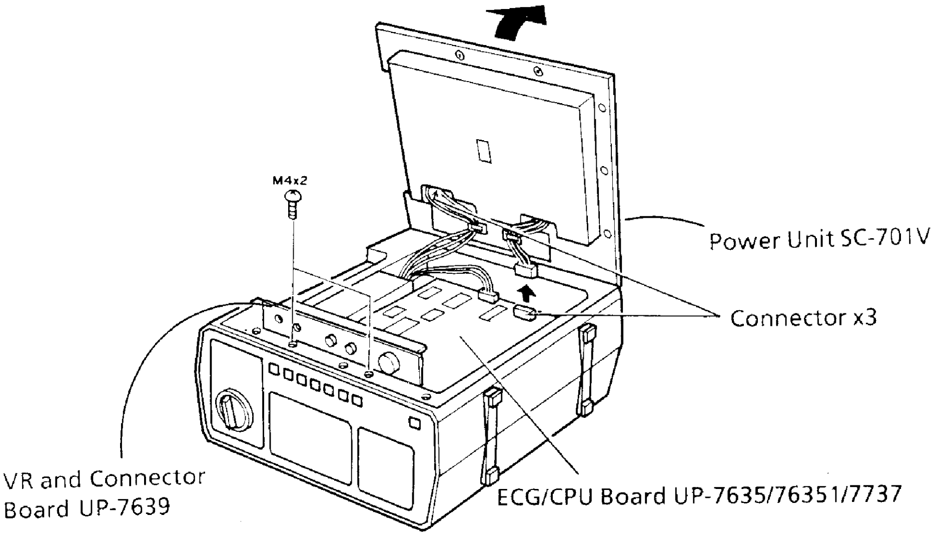

Connector x3
M3x2
Paddle Connector Receptacle

6-6 Lower Casing

1. Remove the eight M4 screws on the bottom of the main unit.

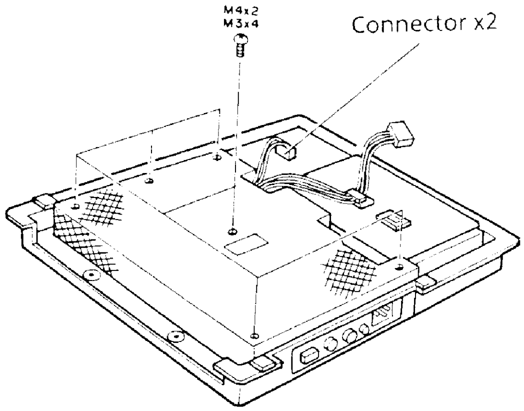


2. Open the lower casing from the front side.
3. Disconnect the three connectors.

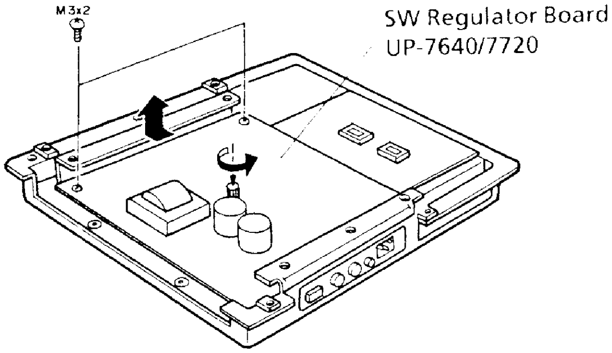

M4x2
Power Unit SC-701V
Connector x3
VR and Connector Board UP-7639
ECG/CPU Board UP-7635/76351/7737

6-7 Power Unit SC-701V (SW Regulator Board UP-7640/7720)

1. Remove the upper casing as shown in section 6-6.
2. Disconnect the two connectors.
3. Remove the two M4 and four M3 screws.
4. Reomve the shield case.

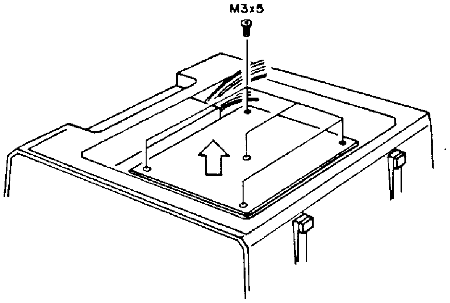

M4x2
M3x4
Connector x2

5. Remove the two M3 screws.
6. Remove the hexa-bolt.
7. Pressing the the board towards the opposite side of the AC inlet, lift up the board.


M3x2
SW Regulator Board
UP-7640/7720

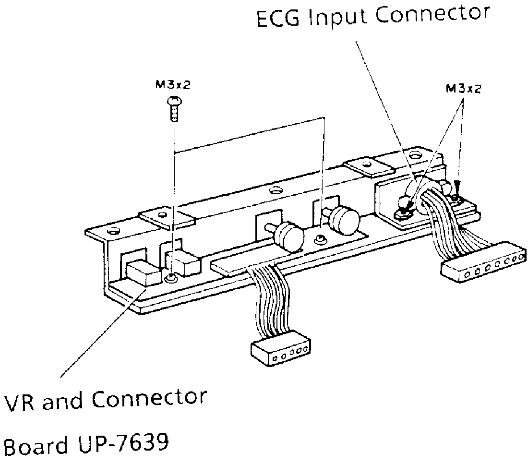
6-8 CPU Board UP-7635/76351/7737

1. Remove the upper casing as shown in section 6-6.
2. Disconnect the eight connectors.
3. Remove the five M3 screws.



6-9 VR and Connector Board UP-7639 & ECG Input Connector

1. Remove the upper casing as shown in section 6-6.
2. Disconnect the two connectors.
3. Remove the two M4 screws.
4. Take out the assembly.
5. Remove the two M3 screws.


ECG Input Connector
M3x2
M3x2
VR and Connector
Board UP-7639

Section 7 MECHANICAL PARTS LIST

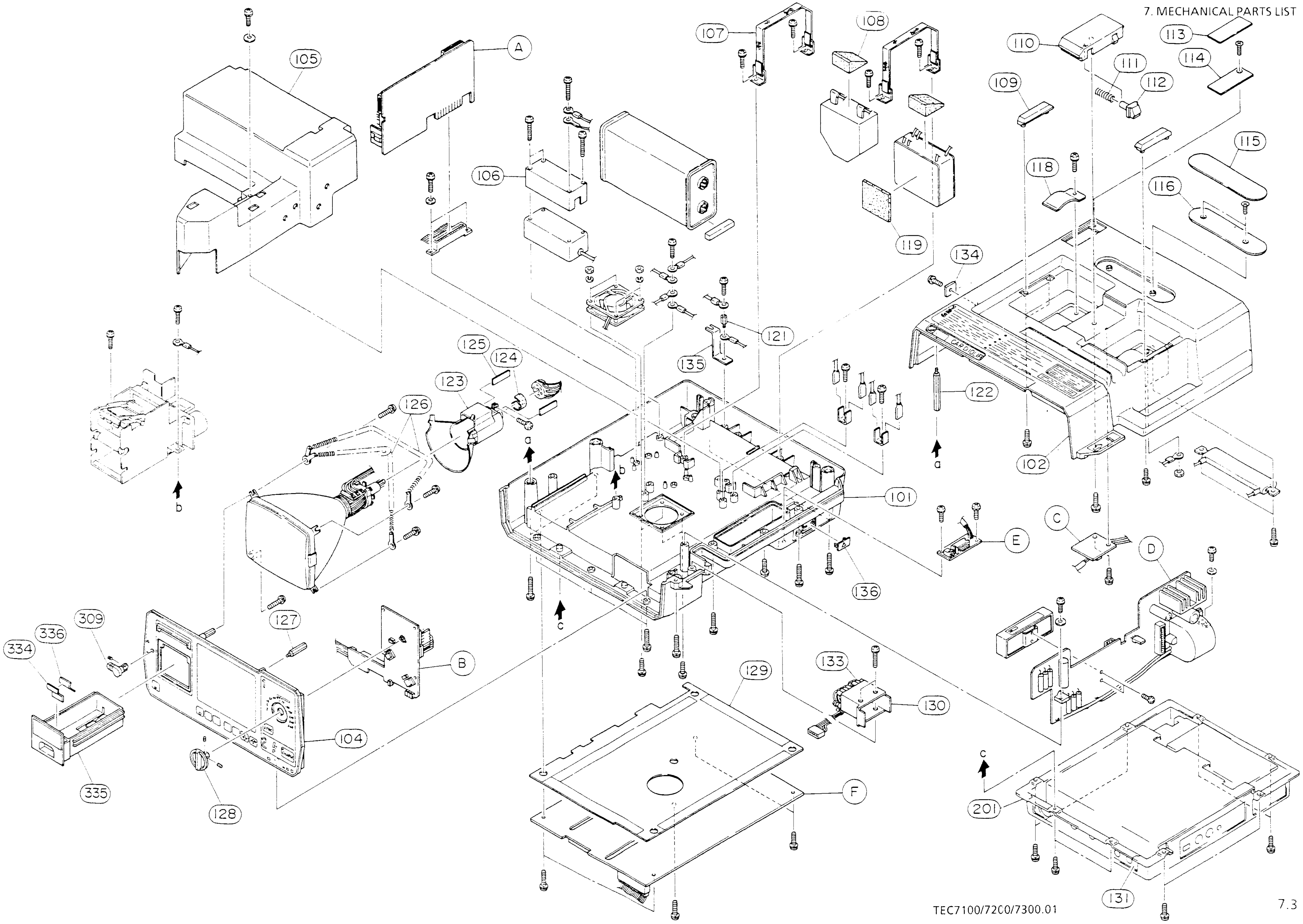
MAIN UNIT-1

INDEX NO.	NK PART NO.	DESCRIPTION	
101	1112-014719	Lower Casing (TEC-7100/7200/7300B, G)	下部ケース (TEC-7100/7200/7300B, G)
	1111-003261E	Lower Casing (Others)	下部ケース (Others)
102	1112-014728	Upper Casing (TEC-7100/7200/7300B, G)	上部ケース (TEC-7100/7200/7300B, G)
	1111-003288B	Upper Casing (Others)	上部ケース (Others)
104	1142-000829A	Front Panel Assembly (English) (TEC7100/7200A, C, J, K)	操作パネルASSY (英語)
	1142-000847B	Front Panel Assembly (German) (TEC-7100/7200G)	操作パネルASSY (独語)
	1142-000731	Front Panel Assembly (English) (TEC-7100/7200B)	操作パネルASSY (英語) (TEC-7100/7200B)
	1142-000856A	Front Panel Assembly (Italian) (TEC-7100/7200R)	操作パネルASSY (伊語)
	1142-000865A	Front Panel Assembly (Spanish) (TEC-7100/7200E)	操作パネルASSY (西語)
	1142-000883	Front Panel Assembly (Finnish) (TEC-7100/7200H)	操作パネルASSY (フィンランド語)
	1142-000704C	Front Panel Assembly (CSA) (TEC-7300A)	操作パネルASSY (CSA)
	1142-000963	Front Panel Assembly (English) (TEC-7300J/K/C)	操作パネルASSY (英語)
		Front Panel Assembly (German) (TEC-7300G)	操作パネルASSY (独語)
		Front Panel Assembly (Spanish) (TEC-7300E)	操作パネルASSY (西語)
105	1113-054308	High Voltage Cover (TEC-7100/7200/7300G)	高圧保護カバー
	1111-003314E	High Voltage Cover (Others)	高圧保護カバー (Others)
106	1114-173837	CRT HV Shield Case	CRT DC-DC シールドケース
107	1114-192941	Condenser Securing Belt	コンデンサー取付バンド
108	1114-174604A	HV Damper	HV クッションゴム
109	1113-046683B	Paddle Lock B	パドルロック B
110	1113-046647B	Paddle Lock Case	パドルロックケース
111	5903666	Spring KC-090-080-0230	スプリング KC-090-080-0230

INDEX NO.	NK PART NO.	DESCRIPTION	
112	1114-173695A	Paddle Lock	パドルロック
113	1124-033827	ZR Blank Sheet	ZR ブランクシート
114	1114-174212B	ZR Blank Panel (bottom)	ZR ブランクドパネル
115	1124-033863	ZR Blank Sheet 2	ZR ブランクシート 2
116	1114-174596A	ZR Blank Panel 2 (bottom)	ZR 用ブランクドパネル 2
117	6402607	Bind Screw M4 x 8	バインド小ネジ M4×8
118	1114-173801A	Test Load Electrode	テストロード電極
119	1114-174613	Relay Damper	リレー用クッションゴム
121	6492937	Spacer M4.L = 10mm	間隔支柱 M4
122	6491983	Spacer Shaft UN18-2102-0040 L = 70	UN18-2102-0040 L=70
123	1113-046674C	CRT Shield Case	CRT シールドケース
124	1114-176576	Shield Tube Sponge	シールドチューブスポンジ
125	1114-176487	CRT Insulation Plate	CRT 絶縁板
126	1114-122964	CRT Ground Spring	CRT 用アースバネ
127	1114-179706	CRT Support	ブラウン管支柱 L=18
128	1143-004565B	Energy Select Knob	エネルギー選択ツマミ
129	1113-046968B	CPU Shield Plate	CPU 絶縁板
130	1113-046932A	Socket Housing (TEC-7200/7300)	ソケットハウジング
131	1113-047067A	Harness Holder - 1 (TEC-7100)	ハーネスホールダー-1
132	1113-047076	Harness Holder - 2 (TEC-7100)	ハーネスホールダー-2
133	1113-046736A	Socket Insulator	ソケットインスレータ
134	1114-173748A	Rubber Foot (side)	ゴム足(横)
135	1114-174221	ZR Ground Mounting	ZR 用アース金具
136	1114-177735A	Dip Switch Cover	ディップスィッチキャップ
A	UP-7740	CRT Driver	
B	UP-7638	Front Panel Board	
C	UP-7596/7596G	Test Detect Board	
D	UP-7636/7851	High Voltage Board	
E	UP-7682	DIP Switch Board	
F	UP-7635/76351/ 7737	ECG / CPU Board	

Recorder-1

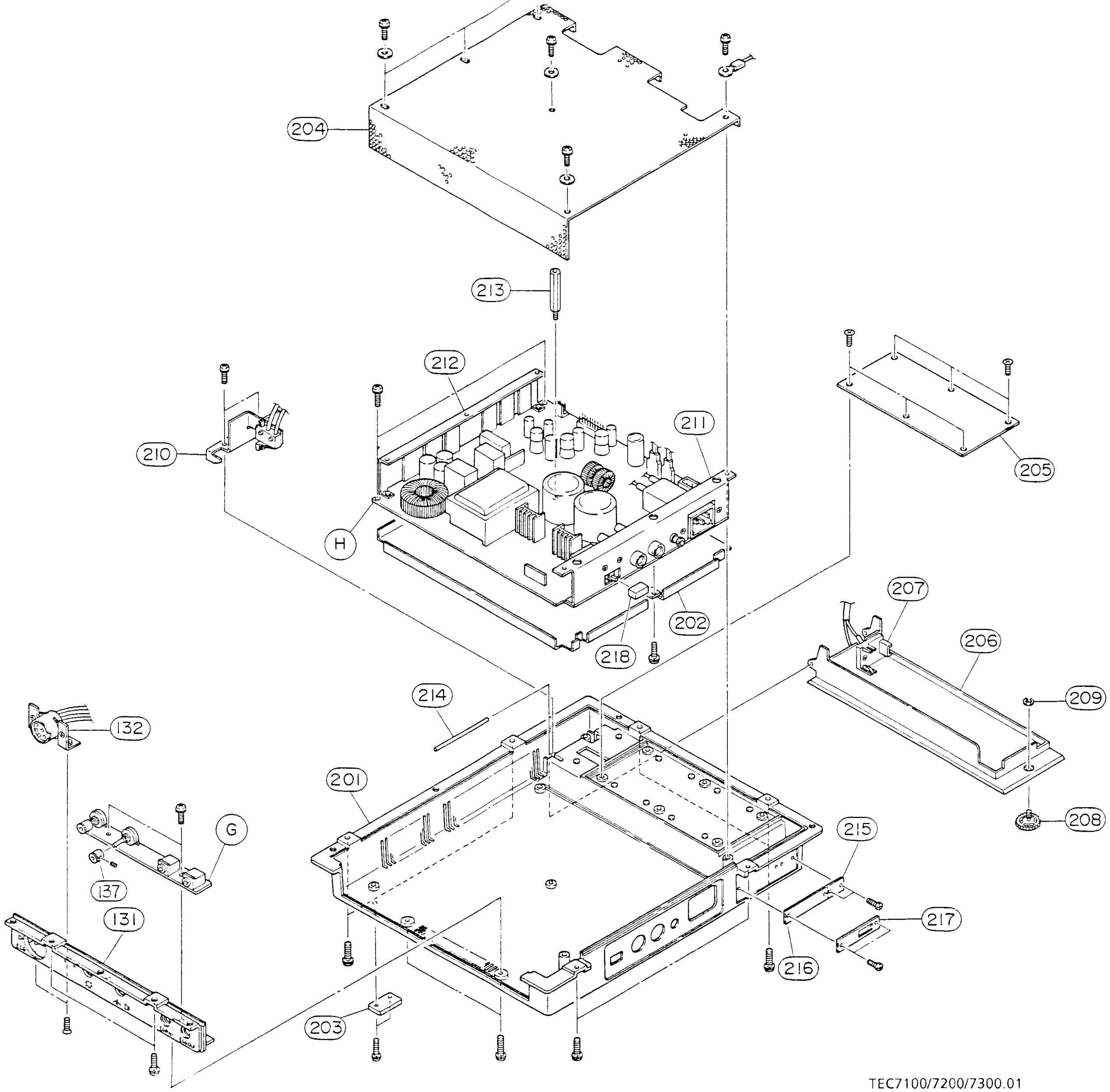
INDEX NO.	NK PART NO.	DESCRIPTION	
309	1114-173392	Lever	レバー
334	1114-173463A	Tension Spsring	テンションバネ
335	1113-046629A	Paper	紙入れケース
336	1114-173543	Felt	フェルト


A
a
b
a
b
C
E
D
c
B
F
c

Power Unit

INDEX NO.	NK PART NO.	DESCRIPTION	
131	1122-005122B	Front Connector Panel (2) (English)	前面コネクタパネル（英語）
	1122-005158C	Front Connector Panel (2) (German)	前面コネクタパネル（独語）
	1122-005381A	Front Connector Panel (2) (Spanish)	前面コネクタパネル（西語）
132	1114-173784A	ECG Connector Holder	ECGホルダー
137	1114-173712	VR Knob	VRツマミ
G	UP-7639	VR and Connector Board	

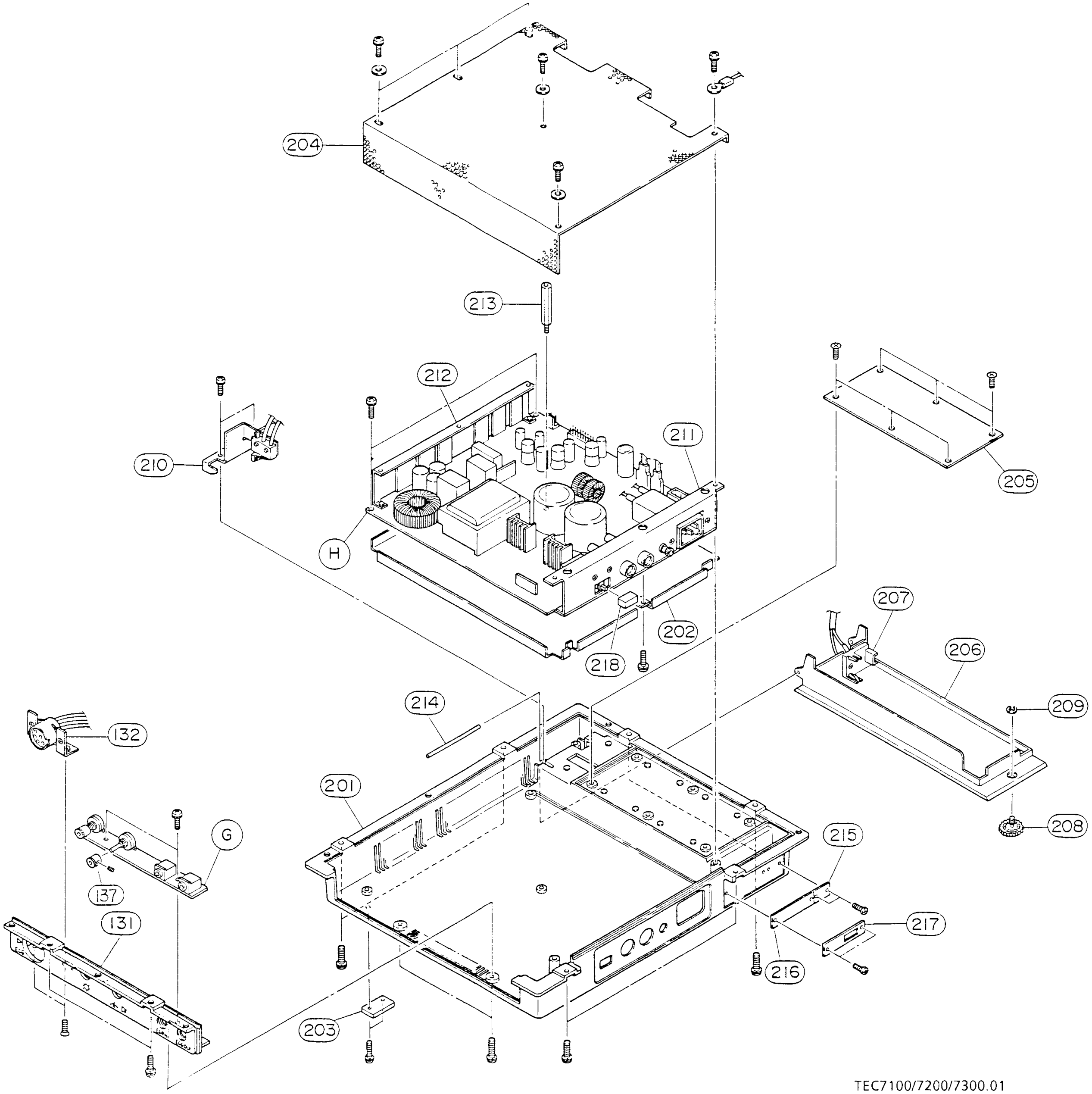
INDEX NO.	NK PART NO.	DESCRIPTION	
201	111-003252A	Power Casing	電源ケース
202	1113-047682A	Shield Cover, Bottom, Power Unit	シールド板（下）
203	1114-173739A	Rubber Foot (bottom)	ゴム足（黒）
204	1113-046665B	Shield Cover, Top, Power Unit	シールドカバー
205	1114-174622	Insulation Plate	断熱板
206	1112-014336A	Battery Case	バッテリーケース
207	2113-013175	Battery Terminal Mounting	バッテリー端子台
208	1144-012581	Battery Case Lock Knob	バッテリーロックツマミ
209	5900152	Retainer Ring	リテナリング
210	1114-173855	Micro Switch Holder	マイクロSW取付金具
211	1113-046816A	Power Unit Chassis	電源下パネル
212	1114-175078	Heat Sink	放熱板
213	6491894	Spacer UN18-2102-0030 L = 38	UN18-2102-0030 L=38
214	1114-173677	Shaft	シャフト
215	1124-000836A	AC Power Plate (117V / 60Hz)	本体AC銘板（117V/60Hz）
	1124-000845	AC Power Plate (220V / 50Hz)	本体AC銘板（220V/50Hz）
	1124-000854	AC Power Plate (240V / 50Hz)	本体AC銘板（240V/50Hz）
215 ~ 217	1104-005397	AC Power Plate (TEC-7100 / 7200G)	本体AC銘板（TEC-7100/7200G）
216	1194-005307	Plate (2)	本体銘板（2）
217	1114-144155	Plate (5)	本体銘板（5）
218	5690306	Knob BS15-01 (ivory)	ツマミBS15-01（アイボリ）
H	SC-701V	Power Unit	パワーユニット


H
G

Recorder - 2

INDEX NO.	NK PART NO.	DESCRIPTION	
301	1144-012563A	Main Base Assembly (TEC-7100/7200)	基台 ASSY
	1144-014196	Main Base Assembly (TEC-7300)	基台 ASSY
302	1144-013036	Base Assembly	基板 ASSY
303	1114-173454C	Platen	プラテン軸
304	1114-173374A	Guide Flange	ガイドフランジ
305	1114-194137	Flange	フランジ軸
306	1114-173445A	Paper Guide Spring Plate	[illegible]
307	1114-173481	Click	クリック
308	1114-194128	Microswitch Mounting Plate	マイクロスイッチ取付板
310	1114-173516A	Lever Shaft	レバー軸
311	1114-173588A	Lever Bearing	レバー軸受け
312	1114-173418B	Paper Detection Collar	検出カラー
313	1114-173507A	Spring	回転バネ
314	1144-012572B	Boss Assembly	回転ボス ASSY
315	1114-173614A	Slide Plate	スライド板
316	5900179	Retainer Ring E-40 (SUS)	リテナリング E-40 (SUS)
317	5900161	Retainer Ring E-32 (SUS)	リテナリング E-32 (SUS)
318	5903577	Timing Belt	タイミングベルト MM-90-3.2
319	1114-170555	Pully Gear 18-108	プーリ歯車 18-108
320	1114-178298	Timing Pully 40	タイミングプーリ 40
321	6492429	Spacer Φ4×4	スペーサ Φ4×4
322	1114-173436	Head Spring 1.0 diameter (left)	ヘッドバネ Φ1.0 (左)
323	1144-012545	Motor Gear Assembly (TEC-7100/7200)	モータ歯車ASSY
323 + L	4740986	Rotary Encorder (TEC-7300)	ロータリエンコーダ200P/R
324	1114-173534B	Gear Shaft	中継軸
325	1114-173605	Sensor Mounting Plate (TEC-7100/7200)	検出センサ取付板
	1114-194574	Sensor Mounting Plate (TEC-7300)	磁気センサ取付板
326	1114-173427	Head Spring 1.0 diameter (right)	ヘッドバネ Φ1.0 (右)
327	1114-170029A	Head Holder	ヘッド取付金具
328	1114-173472	Head Main Shaft	ヘッド主軸

INDEX NO.	NK PART NO.	DESCRIPTION	
329	1114-176585	Guide Spring	ガイドバネ
330	1114-176496B	Speaker Plate	スピーカー取付板
331	1114-173766A	Speaker Sponge	スピーカースポンジ
332	1114-194119	Head Collar	ヘッドあげカラー
333	5900188	Retainer Ring E-50 (SUS)	リテナリング E-50 (SUS)
334	1114-173463A	Tension Spring	テンションバネ
337	1114-173525	Guide Shaft	ガイド軸 A
I	UP-7713	Speaker Connection Board	
J	UP-7702	Feed Sensor Board	
K	UP-7738	Motor Control Board	
L	4790673	Magnetic Sensor FP-2R-02 (TEC-7100/7200)	
M	UP-7644	Paper Sensor Board	
N	4810447	Motor EN35-H107N1B	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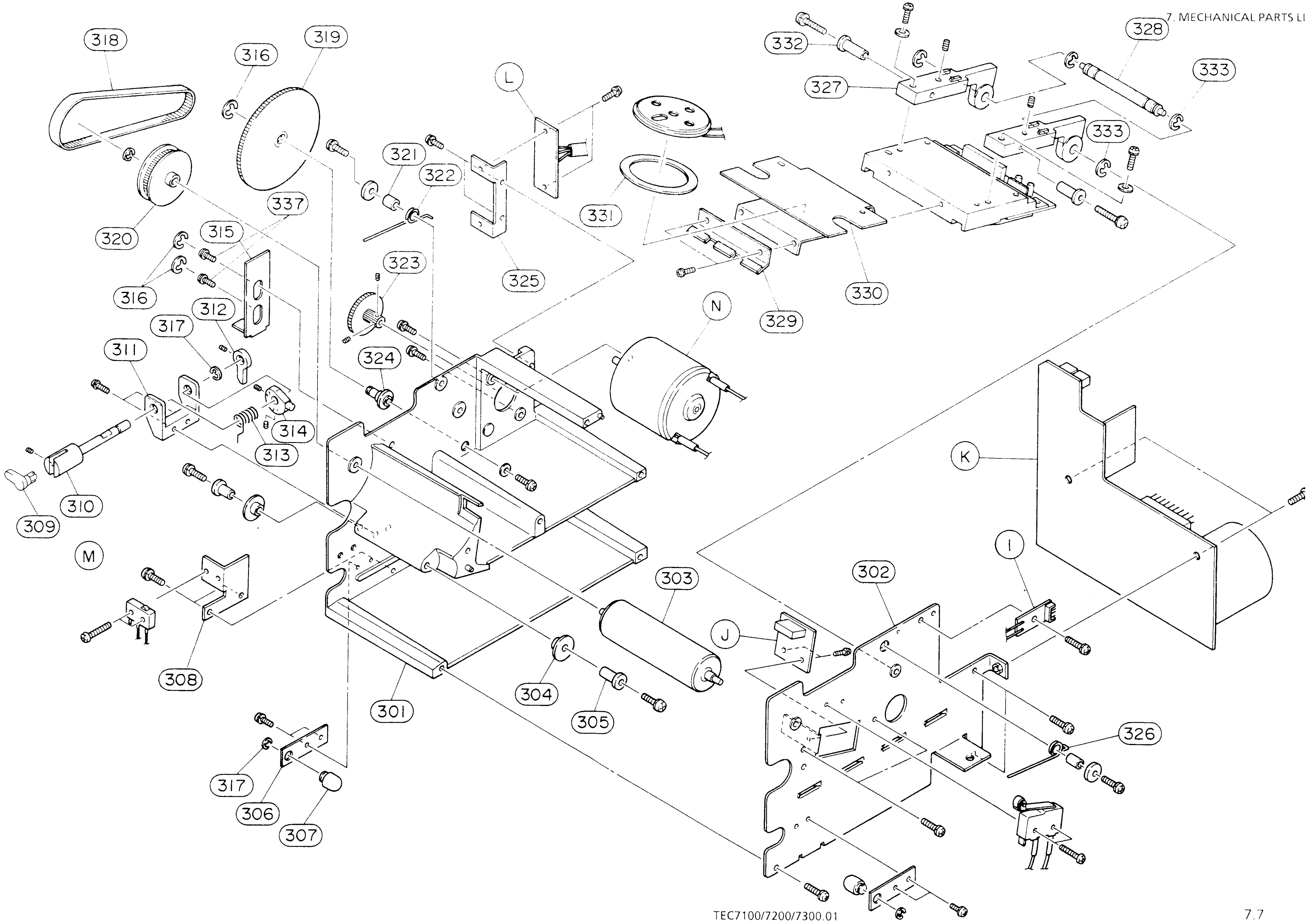

L
N
K
M
I
J

Section 8 Electrical Parts List

PAGE

- TEC-7100#
  - TEC-7000X CHASSIS PARTS-1 ---------- 8.4
  - YZ-00#G# CHASSIS PARTS-2 ---------- 8.35
  - UP-7639# VR AND CONNECTOR BD ---------- 8.33
    - UP-7639 VR AND CONNECTOR BD ---------- 8.11
  - UP-7682 DIP SW BD ---------- 8.14
  - US-7635# ECG/CPU BD (with ROM)
    - UP-76351 ECG/CPU BD (without ROM) ---------- 8.29
  - UP-7851 (TEC-7100G)
UP-7636 (Others) HIGH VOLTAGE BD ---------- 8.27
8.9
  - UP-7850 (TEC-7100G) RELAY BD ---------- 8.27
  - UP-7596G (TEC-7100G)
UP-7596 (Others) TEST DETECT BD ---------- 8.5
8.4
  - UP-7740 CRT DRIVER ---------- 8.25
  - UP-7638 FRONT PANEL BD ---------- 8.11
  - WS-701V# RECORDER UNIT
    - WS- 701X RECORDER CHASSIS PARTS ---------- 8.34
    - UP-7738 MOTOR CONTROL BD ---------- 8.24
  - SC-701V# POWER UNIT
    - SC-701V# POWER UNIT CHASSIS PARTS-1 ---------- 8.12
    - SC-703X (TEC-7100B/G)
SC-704X (Others) POWER UNIT CHASSIS PARTS-2 ---------- 8.3
8.4
    - UP-7720 (TEC-7100B)
UP-7720G (TEC-7100G)
UP-7640 (Others) SW REGULATOR ---------- 8.14
8.17
8.12
  - ND-701V# EXTERNAL PADDLE
    - ND-705X (TEC-7100G)
ND-701X (Others) EXTERNAL PADDLE ---------- 8.1

Units with # mark differ according to the model.
See page 1.10 for units with # mark.

PAGE

- TEC-7200#
  - TEC-7000X — CHASSIS PARTS-1 — 8.4
  - YZ-00#G# — CHASSIS PARTS-2 — 8.35
  - UP-7639# — VR AND CONNECTOR BD — 8.33
    - UP-7639 — VR AND CONNECTOR BD — 8.11
  - UP-7682 — DIP SW BD — 8.14
  - US-7635# — ECG/CPU BD (with ROM)
    - UP-7635 — ECG/CPU BD (without ROM) — 8.5
  - UP-7851 (TEC-7200G)
UP-7636 (Others) — HIGH VOLTAGE BD — 8.27
8.9
  - UP-7850 (TEC-7200G) — RELAY BD — 8.27
  - UP-7596G (TEC-7200G)
UP-7596 (Others) — TEST DETECT BD — 8.5
8.4
  - UP-7740 — CRT DRIVER — 8.25
  - UP-7638 — FRONT PANEL BD — 8.11
  - WS-701V# — RECORDER UNIT
    - WS-701X — RECORDER CHASSIS PARTS — 8.34
    - UP-7738 — MOTOR CONTROL BD — 8.24
  - SC-701V# — POWER UNIT
    - SC-701V# — POWER UNIT CHASSIS PARTS-1 — 8.2
    - SC-703X (TEC-7200B/G)
SC-704X (Others) — POWER UNIT CHASSIS PARTS-2 — 8.3
8.4
    - UP-7720 (TEC-7200B)
UP-7720G (TEC-7200G)
UP-7640 (Others) — SW REGULATOR — 8.14
8.17
8.12
  - ND-702V# — EXTERNAL PADDLE
    - ND-706X (TEC-7200G)
ND-702X (Others) — EXTERNAL PADDLE — 8.2
8.1

Units with # mark differ according to the model.
See page 1.11 for units with # mark.

PAGE

- TEC-7300#
  - TEC-7000X — CHASSIS PARTS-1 — 8.4
  - YZ-00#G# — CHASSIS PARTS-2 — 8.35
  - UP-7639# — VR AND CONNECTOR BD — 8.33
    - UP-7639 — VR AND CONNECTOR BD — 8.11
  - UP-7682 — DIP SW BD — 8.14
  - US-7737# — ECG/CPU BD (with ROM)
    - UP-7737 — ECG/CPU BD (without ROM) — 8.19
  - UP-7851 (TEC-7300G) / UP-7636 (Others) — HIGH VOLTAGE BD — 8.27 / 8.9
  - UP-7850 (TEC-7300G) — RELAY BD — 8.27
  - UP-7596G (TEC-7300G) / UP-7596 (Others) — TEST DETECT BD — 8.5 / 8.4
  - UP-7740 — CRT DRIVER — 8.25
  - UP-7638 — FRONT PANEL BD — 8.11
  - WS-702V# — RECORDER UNIT
    - WS- 702X — RECORDER CHASSIS PARTS — 8.34
    - UP-7738 — MOTOR CONTROL BD — 8.24
  - SC-701V# — POWER UNIT
    - SC-701V# — POWER UNIT CHASSIS PARTS-1 — 8.12
    - SC-703X (TEC-7300B/G) / SC-704X (Others) — POWER UNIT CHASSIS PARTS-2 — 8.3 / 8.4
    - UP-7720 (TEC-7300B) / UP-7720G (TEC-7300G) / UP-7640 (Others) — SW REGULATOR — 8.14 / 8.17 / 8.12
  - ND-702V# — EXTERNAL PADDLE
    - ND-706X (TEC-7300G) / ND-702X (Others) — EXTERNAL PADDLE — 8.2 / 8.1

Units with # mark differ according to the model.
See page 1.12 for units with # mark.

When ordering replacement parts, please specify :

Instrument Type (TEC-7100 / 7200/7300)
Code No.
Description

Note : Most resistors which can be locally procured are omitted.

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION	
UP-1234	IC101	1234567	1	OPIC	AB1234

Part name
* Abbreviation
Q'ty used in this instrument
NIHON KOHDEN part number
Symbol used in circuit diagrams
Assembly name

* See next page.

ABBREVIATIONS

CN CONNECTOR

ACN	Square
ACN1	Square, plug
ACN2	Square, receptacle
BCN	Card edge
CCN	Round
CCN1	Round, plug
CCN2	Round, receptacle
CN	Coaxial plug or other types
CORD	Accessory cord
NCN	Nylon connector and pins
PCN	For use on PC board, short plug, terminal board

C CAPACITOR

MPC	Metallized film
OFC	Oil
TAC	Tantalum
TCO2	Tantalum, tubelar
TCO4	Tantalum, vertical
VC	Variable
C	Barium titanate, paper, etc.
CEC1	Ceramic, withstanding voltage; <100V
CEC2	Ceramic, withstanding voltage; ≥100V
CM	Module
ECB	Electrolytic, block
CEO2	Electrolytic, tubelar
CEO4	Electrolytic, vertical
FLC	Plastic film, ±5%
FLCB	Plastic film, block
FLC1	Plastic film, vertical
FLC2	Plastic film, tubelar
MCC	Mica

D DIODE

D	Diode, array, for small signal
DB	Block, power, bridge
DP	Power, silicon diode, etc.
LCD	Liquid crystal display
LED	Light emitting diode, LED array
LEDC	LED character
SCR	Silicon controlled rectifier (SCR, thyristor)
ZD1	Zenor, ≤5V
ZD2	Zenor, ≤10V
ZD3	Zenor, >10V

IC INTEGRATED CIRCUIT

ADIC	A/D or D/A converter
AIC	Analog (log. amp., comparator, switch, sample & hold etc.)
CPU	CPU, CPU peripheral devices (RAM, I/O port, etc.)
DIC	Digital (timer, NMOS, PMOS, registor, etc.)
MIC	CMOS
OPIC	Operational amp. buffer amp., etc.
REG	Regulator
TIC	TTL

Q TRANSISTOR

TR	Uni-junction, etc.
TRA	Type 2SA; PNP, high speed
TRB	Type 2SA; PNP, low speed
TRC	Type 2SC; NPN, high speed
TRD	Type 2SD; NPN, low speed
TRP	Photo-electric device, photo-fiber, etc.
FET	**FIELD EFFECT TRANSISTOR**
FET	Type 3SK/3SJ (dual gate, N-ch/P-ch)
FETJ	Type 2SJ (mono gate, P-ch)
FETK	Type 2SK (mono gate, N-ch)

SW SWITCH

ATT	Attenuator
DSW	Digital
PSW1	Push button, 1 button type
≀	≀ , ≀
PSW9	Push button, 9 button type
PSW0	Push button, 10 button type
RSW	Rotary
SW	Micro, DIP, Toggle (tumbler), disc, etc.

T TRANSFORMER

CH	Choke coil
FBTF	Flyback
L	Inductance (coil)
MATF	Matching (IPTF, OPTF, IFTF)
PLTF	Pulse, oscillation TF
PT	Power (except for switching purpose)
T	High voltage, differential, HV unit, power supply, etc.
YOKE	Deflecting yoke

MOTOR

ACMO	AC (including gear head)
DCMO	DC (including gear head)
FAMO	Fan
PUMO	Pulse step (with gear head)

TUBE

CRT	Cathode ray tube
GA	Gas arrestor
NE	Neon tube, neon discharge tube
TUBE	Vacuum tube

R RESISTOR

RM	R module (including R and C)

RV VARIABLE RESISTOR

POT	Potentiometer
TPOT	Potentiometer on PCB, > 15mm in dia.
TVR1	Carbon on PCB
TVR2	Carbon on PCB
TWVR	Wirewound on PCB
VR	On panel
VR1	On panel, ≤ 30mm in dia.
VR2	On panel, > 30mm in dia.
WVR	Wirewound, large current

MISCELLANEOUS

GAGE	Gauge
METR	Meter, digital meter, manometer, electromagnetic counter, etc.
PRB	Pick-up, microphone, ultrasonic probe, etc.
SP	Speaker, headphone, earphone, buzzer, etc.
TD	Transducer, galvanometer coil, pressure meter, differential pressure meter
THP	Thermal/temperature sensor/probe, thermometer, etc.
SOCK	Socket, cap
FH	Fuse holder
FUSE	Fuse
TERM	Terminal, lug board, etc.
BUS	Bus bar
LAMP	Lamp. bracket
BATT	Battery, battery holder, recharger, etc.
UNIT	Display/recorder/printer/disc-drive unit, etc.
MD	Module, unit, hybrid IC, etc.
TH	Line filter, thermistor, varistor, CdS, etc.
RY	Relay, reed relay, solenoid relay
ANT	Antenna
XTAL	Crystal
HEAD	Thermal head/array, discharge head/array
VALV	Valve, electromagnetic valve

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION

ND-701X EXTERNAL PADDLE

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION
ND-701X		3352088	1	SW	SKHCAD (KHC10904)
ND-701X		5422276	1	PCN	HKP-14MS-7BT
ND-701X		5428047	2	PCN	170823-6
ND-701X		5428199	1	PCN	HKP-14FS02-7BT (10)
ND-701X	CNP551-CNP552	5428056	2	PCN	61874-1
ND-701X	D050	1102237	1	LED	HLMP-2855 (GREEN)
ND-701X	SW051-SW052	3202508	2	PSW1	8P-2021

ND-702X EXTERNAL PADDLE

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION
ND-702X		5415792	2	NCN	201330-1 Pin
ND-702X		5422276	1	PCN	HKP-14MS-7BT
ND-702X		5428207	1	PCN	350036-2 with HKP-14FS (4)
ND-702X	D050	1102237	1	LED	HLMP-2855 (GREEN)
ND-702X	D051	1100943	1	LED	HLMP2500 green
ND-702X	D052	1100934	1	LED	HLMP2400 Yellow
ND-702X	D053	1100925	1	LED	HLMP2300 Red
ND-702X	SW050	3352088	1	SW	SKHCAD (KHC10904)
ND-702X	SW051-SW052	3202508	2	PSW1	8P-2021

ND-705X EXTERNAL PADDLE

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION
ND-705X		3352088	1	SW	SKHCAD (KHC10904)
ND-705X		5422276	1	PCN	HKP-14MS-7BT
ND-705X		5428047	2	PCN	170823-6
ND-705X		5428199	1	PCN	HKP-14FS02-7BT (10)
ND-705X	CNP551-CNP552	5428056	2	PCN	61874-1
ND-705X	D050	1102237	1	LED	HLMP-2855 (GREEN)
ND-705X	SW051-SW052	3202508	2	PSW1	8P-2021

ND-706X EXTERNAL PADDLE

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
ND-706X		5415792	2	NCN 201330-1 Pin
ND-706X		5422276	1	PCN HKP-14MS-7BT
ND-706X		5428207	1	PCN 350036-2 with HKP-14FS (4)
ND-706X	D050	1102237	1	LED HLMP-2855 (GREEN)
ND-706X	D051	1100943	1	LED HLMP2500 green
ND-706X	D052	1100934	1	LED HLMP2400 Yellow
ND-706X	D053	1100925	1	LED HLMP2300 Red
ND-706X	SW050	3352088	1	SW SKHCAD (KHC10904)
ND-706X	SW051-SW052	3202508	2	PSW1 8P-2021

SC-701VA POWER UNIT CHASSIS PARTS-1

SC-701VA		5620062	2	FUSE SAU-4A
SC-701VA		5625404	2	FH FEK 031.1661 Cap

SC-701VE POWER UNIT CHASSIS PARTS-1

SC-701VE		5621079	2	FUSE 179 120-2A
SC-701VE		5625413	2	FH FEK 031.1663 Cap

SC-701VG POWER UNIT CHASSIS PARTS-1

SC-701VG		5621079	2	FUSE 179 120-2A
SC-701VG		5625413	2	FH FEK 031.1663 Cap

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

SC-701VH POWER UNIT CHASSIS PARTS-1

SC-701VH		5621079	2	FUSE 179 120-2A
SC-701VH		5625413	2	FH FEK 031.1663 Cap

SC-701VJ POWER UNIT CHASSIS PARTS-1

SC-701VJ		5620062	2	FUSE SAU-4A
SC-701VJ		5625404	2	FH FEK 031.1661 Cap

SC-701VK POWER UNIT CHASSIS PARTS-1

SC-701VK		5621079	2	FUSE 179 120-2A
SC-701VK		5625413	2	FH FEK 031.1663 Cap

SC-701VR POWER UNIT CHASSIS PARTS-1

SC-701VR		5621079	2	FUSE 179 120-2A
SC-701VR		5625413	2	FH FEK 031.1663 Cap

SC-703X POWER UNIT CHASSIS PARTS-2

SC-703X		3280111	1	SW SS-5GL2
SC-703X		5500922	1	CORD 170187-2 (300) Red
SC-703X		5500931	1	CORD 170187-2 (300) Black
SC-703X		5500949	1	CORD 171822-2 2P with Cord

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

SC-704X POWER UNIT CHASSIS PARTS-2

SC-704X		3280111	1	SW SS-5GL2
SC-704X		5500922	1	CORD 170187-2 (300) Red
SC-704X		5500931	1	CORD 170187-2 (300) Black
SC-704X		5500949	1	CORD 171822-2 2P with Cord

TEC7000X CHASSIS PARTS-1

TEC7000X		3790149	1	T D/D Converter SWH-5042Y
TEC7000X	CNP105	5427583	1	PCN M62-1503038SA-1 (20)
TEC7000X	CNP106	5500869	1	CORD HIF3A5B-40D-AC(10)
TEC7000X	CNP355	5500806	1	CORD Paddle ECG Connection Cable
TEC7000X	CNP607	5427467	1	PCN M62-12-3039SA (10)
TEC7000X	CNP610	5421018	1	ACN1 A3-705B-00J 3P PLUG FEMALE
TEC7000X	CNP751	5500887	1	CORD HIF3A-34D-AC(5)
TEC7000X		2000586	1	CRT CRT140CYB31
TEC7000X	CNP600	3793226	1	YOKE YS-33276E with Cord
TEC7000X	CNP620	5500789	1	CORD CRT CORD 9P with Connector
TEC7000X		3400286	1	RY HV Relay NKR-203 12V/30HM
TEC7000X		3751138	1	CH NKL-201 28uH TTR
TEC7000X	CNP535	5500833	1	CORD HV Cable 41898(250) Red
TEC7000X	CNP545	5500842	1	CORD HV Cable 41898(180) White
TEC7000X	CNP565	5500815	1	CORD HV Cable 41898(150) Red

UP-7596 TEST DETECT BD

UP-7596	CNP555	5500798	1	CORD CORD for TEST LOAD
UP-7596	PC580	0600263	1	TRP PC-827 PHOTOCOUPLER DUAL

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

UP-7596G TEST DETECT BD

UP-7596G	CNP555	5500798	1	CORD CODE for TEST LOAD
UP-7596G	PC580	0600263	1	TRP PC-827 PHOTOCOUPLER DUAL

UP-7635 ECG/CPU BD

UP-7635	CNJ100	5427663	1	PCN M60-12-30-114P STRAIGHT
UP-7635	CNJ101	5445474	1	PCN IL-2P-S3FP2-1
UP-7635	CNJ105	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-7635	CNJ106	5427173	1	PCN HIF3F-40PADSA 40P
UP-7635	CNJ108	5425139	1	PCN HKP-22MS-11BT
UP-7635	CNJ110	5427663	1	PCN M60-12-30-114P STRAIGHT
UP-7635	CNJ157	5427743	1	PCN HIF3F-34PA-2.54DSA
UP-7635	CNJ303	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-7635	CNJ355	5427636	1	PCN M60-03-30-114P STRAIGHT
UP-7635	C100	4317525	1	CEC1 TP D55Y5V1H 104Z 5-W
UP-7635	C103-C109	4317525	7	CEC1 TP D55Y5V1H 104Z 5-W
UP-7635	C111	4317525	1	CEC1 TP D55Y5V1H 104Z 5-W
UP-7635	C112	3820768	1	FLC1 454M6302 104K
UP-7635	C113	4317525	1	CEC1 TP D55Y5V1H 104Z 5-W
UP-7635	C120	3800469	1	EC04 ECEA1HS010 50V1uF
UP-7635	C121	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-7635	C122	4315304	1	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-7635	C123	3800469	1	EC04 ECEA1HS010 50V1uF
UP-7635	C124	4315082	1	FLC1 ECQ-B 1H 222JZ3 0.0022uF
UP-7635	C125-C126	3839793	2	FLC1 ECQ-V1H224JZ 0.22uF
UP-7635	C127	3800469	1	EC04 ECEA1HS010 50V1uF
UP-7635	C128	4315206	1	FLC1 ECQ-B 1H 223JZ3 0.022uF
UP-7635	C129	4317623	1	CEC2 DD05-989B 331K500 (330pF)
UP-7635	C130	4317614	1	CEC2 DD05-989B 221K500 (220pF)
UP-7635	C151	4317552	1	CEC2 DD05-989SL 220K500 (22pF)
UP-7635	C152	3890353	1	ECR-GA035M11-35pF
UP-7635	C153	3839837	1	FLC1 ECQ-V1H474JZ 0.47uF
UP-7635	C201-C206	4315304	6	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-7635	C207-C210	4315162	4	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-7635	C211-C220	4315304	10	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-7635	C230	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7635	C231	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-7635	C232	3800371	1	EC04 ECEA1VS100 35V10uF
UP-7635	C233	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-7635	C234	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-7635	C241-C242	4315046	2	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-7635	C243	3800371	1	EC04 ECEA1VS100 35V10uF
UP-7635	C250-C251	3839873	2	FLC1 ECQ-V1H105JZ 1.0uF
UP-7635	C252	4315269	1	FLC1 ECQ-V 1H 473JZ3 (0.047uF)
UP-7635	C253	4317641	1	CEC2 DD06-999B 681K500 (680pF)
UP-7635	C254	3824461	1	MPC ECQ-V1H 154JZ 50V 0.15uF
UP-7635	C255	4315304	1	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-7635	C256	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-7635	C257-C270	4315304	14	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-7635	C271-C272	3800219	2	EC04 ECEA1CS470 16V47uF
UP-7635	C273	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-7635	C274	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF
UP-7635	C275	4315269	1	FLC1 ECQ-V 1H 473JZ3 (0.047uF)
UP-7635	C301-C304	4315046	4	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-7635	C305	3839819	1	FLC1 ECQ-V1H334JZ 0.33uF
UP-7635	C306	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-7635	C307	3800371	1	EC04 ECEA1VS100 35V10uF
UP-7635	C309-C310	3800371	2	EC04 ECEA1VS100 35V10uF
UP-7635	C311	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-7635	C312	4315287	1	FLC1 ECQ-V 1H 683JZ3 (0.068uF)
UP-7635	C351-C352	4315162	2	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-7635	C353	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-7635	C354	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-7635	C355-C356	3800371	2	EC04 ECEA1VS100 35V10uF
UP-7635	C381-C382	3839793	2	FLC1 ECQ-V1H224JZ 0.22uF
UP-7635	C383	3810832	1	TC04 204M3502 105M4 (1uF/35V)
UP-7635	C384	4315269	1	FLC1 ECQ-V 1H 473JZ3 (0.047uF)
UP-7635	C385	4315242	1	FLC1 ECQ-V 1H 333JZ3 (0.033uF)
UP-7635	C386-C387	4317525	2	CEC1 TP D55Y5V1H 104Z 5-W
UP-7635	C401	4317614	1	CEC2 DD05-989B 221K500 (220pF)
UP-7635	C402-C407	4317525	6	CEC1 TP D55Y5V1H 104Z 5-W
UP-7635	DA101	0950571	1	D MA430
UP-7635	DA102	0800582	1	D Diode Array DAN 401
UP-7635	DA103	0800573	1	D Diode Array DAP 401
UP-7635	DA104	0800582	1	D Diode Array DAN 401
UP-7635	DA105	0800573	1	D Diode Array DAP 401
UP-7635	DA231	0800573	1	D Doide Array DAP 401
UP-7635	DA232	0800582	1	D Diode Array DAN 401
UP-7635	DA233	0800573	1	D Diode Array DAP 401

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION
UP-7635	D100-D106	4322528	7	D	1S2076ARE
UP-7635	D151-D153	4322528	3	D	1S2076ARE
UP-7635	D201-D216	0800564	16	D	1SS237
UP-7635	D217-D218	4322528	2	D	1S2076ARE
UP-7635	D219	0800564	1	D	1SS237
UP-7635	D220-D225	4322528	6	D	1S2076ARE
UP-7635	D230-D231	4322528	2	D	1S2076ARE
UP-7635	D232	0800092	1	D	0A91(1S1005)
UP-7635	D241-D242	4322528	2	D	1S2076ARE
UP-7635	D253-D259	4322528	7	D	1S2076ARE
UP-7635	D301-D302	4322528	2	D	1S2076ARE
UP-7635	D303-D304	4327612	2	ZD2	HZ9C1RE (8.9-9.3V)
UP-7635	D305-D314	0800644	10	D	1SV126
UP-7635	D351-D354	4322528	4	D	1S2076ARE
UP-7635	D355-D356	4327612	2	ZD2	HZ9C1RE (8.9-9.3V)
UP-7635	D357-D358	4322528	2	D	1S2076ARE
UP-7635	D381-D382	4322528	2	D	1S2076ARE
UP-7635	D401	4322528	1	D	1S2076ARE
UP-7635	GA351	2100335	1	GA	B1C90 (90V)
UP-7635	ICS103	5422846	1	SOKT	IC SOCKET DL-2-28A (01)
UP-7635	ICS107	5601279	1	SOKT	208-93-764 64PIC SOCKET
UP-7635	ICS201	5601279	1	SOKT	208-93-764 64PIC SOCKET
UP-7635	ICS203	5422846	1	SOKT	IC SOCKET DL-2-28A (01)
UP-7635	ICS405	5601279	1	SOKT	208-93-764 64PIC SOCKET
UP-7635	IC101	1205786	1	CPU	uPD71055C(82C55A-2)
UP-7635	IC102	1302859	1	CPU	uPD8279C-2
UP-7635	IC104	1302984	1	MIC	uPD74HC138C(HD74HC138P)
UP-7635	IC105	1253403	1	AIC	TL7700C
UP-7635	IC106	1303528	1	MIC	uPD74HC123C(HD74HC123P)
UP-7635	IC107	1205768	1	CPU	HD63B03XP
UP-7635	IC108	1303074	1	MIC	uPD74HC4040C(HD74HC4040P
UP-7635	IC109	1302948	1	MIC	uPD74HC08C(HD74HC08P)
UP-7635	IC110	1302975	1	MIC	HD74HC32P(uPD74HC32C)
UP-7635	IC112	1203752	1	TIC	SN74LS365
UP-7635	IC114	1252752	1	OPIC	HA17082PS 2FET
UP-7635	IC115	1302948	1	MIC	uPD74HC08C(HD74HC08P)
UP-7635	IC116	1302912	1	MIC	HD74HC00P(uPD74HC00C)
UP-7635	IC151	1303662	1	CPU	MSM6242 RS
UP-7635	IC201	1205768	1	CPU	HD63B03XP
UP-7635	IC202	1253501	1	ADIC	uPD-7004C8CH10BITA/D
UP-7635	IC204	1206473	1	CPU	MB84256-10LP-G
UP-7635	IC205	1303065	1	MIC	HD74HC245P(uPD74HC245C)
UP-7635	IC206-IC207	1303056	2	MIC	HD74HC244P(uPD74HC244C)

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION
UP-7635	IC208	1302912	1	MIC	HD74HC00P(uPD74HC00C)
UP-7635	IC209	1302939	1	MIC	HD74HC04P(uPD74HC04C)
UP-7635	IC230	1300629	1	MIC	HD14052BP(MC14052BCP)
UP-7635	IC250	1300629	1	MIC	HD14052BP(MC14052BCP)
UP-7635	IC251	1601875	1	MD	NP2014B
UP-7635	IC252	1300611	1	MIC	HD14051BP(MC14051BCP)
UP-7635	IC253	1300638	1	MIC	HD14053BP(MC14053BCP)
UP-7635	IC254-IC255	1253118	2	OPIC	uPC324C QUAD
UP-7635	IC256	1253715	1	OPIC	uPC812C(LF412CN)2FET
UP-7635	IC257	1300638	1	MIC	HD14053BP(MC14053BCP)
UP-7635	IC258	1252084	1	OPIC	TL072CP
UP-7635	IC301-IC302	1252084	2	OPIC	TL072CP
UP-7635	IC303-IC305	1300611	3	MIC	HD14051BP(MC14051BCP)
UP-7635	IC306	1253724	1	OPIC	uPC4570C
UP-7635	IC307	1251165	1	OPIC	uPC1458C
UP-7635	IC308	1251904	1	AIC	MB4204 (uPC339C)
UP-7635	IC309	1300629	1	MIC	HD14052BP(MC14052BCP)
UP-7635	IC351	1252084	1	OPIC	TL072CP
UP-7635	IC352	1300629	1	MIC	HD14052BP(MC14052BCP)
UP-7635	IC380	1300638	1	MIC	HD14053BP(MC14053BCP)
UP-7635	IC381	1252752	1	OPIC	HA17082PS 2FET
UP-7635	IC401-IC402	1303056	2	MIC	HD74HC244P(uPD74HC244C)
UP-7635	IC403	1303065	1	MIC	HD74HC245P(uPD74HC245C)
UP-7635	IC404	1204902	1	CPU	HM6264LP-15(uPD4364C-15L
UP-7635	IC406	1251174	1	ADIC	uPC624C (DAC-08CQ)
UP-7635	IC408	1300522	1	MIC	HD14042BP (MC14042BCP)
UP-7635	IC409	1303546	1	MIC	HD74HC151P (uPD74HC151C)
UP-7635	IC410	1303074	1	MIC	uPD74HC4040C(HD74HC4040P
UP-7635	IC411	1302921	1	MIC	uPD74HC02C(HD74HC02P)
UP-7635	IC412	1303412	1	MIC	SN74HC03N(uPD74HC03C)
UP-7635	PC301	0600254	1	TRP	PC837
UP-7635	PC302	1704345	1	TRP	PC817 PHOTOCOUPLER
UP-7635	Q230-Q231	4335069	2	TRC	2SC1213AKDTZ
UP-7635	Q240-Q241	4335069	2	TRC	2SC1213AKDTZ
UP-7635	Q250	4330038	1	TRA	2SA495GTM-Y,TPE2
UP-7635	Q251	4335069	1	TRC	2SC1213AKDTZ
UP-7635	RA100	4090582	1	RM	EXB-P84-103J
UP-7635	RA101	4090813	1	RM	EXB-P88-103J
UP-7635	RA102-RA103	4090582	2	RM	EXB-P84-103J
UP-7635	RA104	4090813	1	RM	EXB-P88-103J
UP-7635	RA105-RA106	4091153	2	RM	EXB-T44-101J
UP-7635	RA201-RA202	4092624	2	RM	EXB-T44-472J 4.7 KOHM
UP-7635	RA203	4090822	1	RM	EXB-P88-472J

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7635	RA204	4090787	1	RM EXB-P88-104J
UP-7635	RA206	4090813	1	RM EXB-P88-103J
UP-7635	RA230	4091884	1	RM EXB-P84-472J
UP-7635	RA301	4093338	1	RM CMR-042B 20.0K OHM
UP-7635	RA302	4093347	1	RM CMR-042A 30.1K OHM
UP-7635	RA303	4090689	1	RM EXB-P84-473J
UP-7635	RA304	4093356	1	RM EXB-F8V-154J
UP-7635	RA305-RA306	4091572	2	RM EXB-T44-103J
UP-7635	RA401	4090813	1	RM EXB-P88-103J
UP-7635	SW100	3352168	1	SW DSS 104
UP-7635	SW102	3350838	1	DSW DSS102
UP-7635	T301	3772285	1	PLTF EP17 50KHZ SIG Yellow
UP-7635	T302	3772267	1	PLTF EP17 50KHZ DC-DC red
UP-7635	T351	3772258	1	PLTF EP13 50KHZ SIG Yellow
UP-7635	T352	3772276	1	PLTF EP13 50KHZ DC-DC Red
UP-7635	T381	3772258	1	PLTF EP13 50KHZ SIG Yellow
UP-7635	VR101	4160685	1	TPOT GF06P 100KOHM
UP-7635	VR251	4160596	1	TPOT GF06P 1KOHM
UP-7635	VR252	4160667	1	TPOT GF06P 20KOHM
UP-7635	VR253	4160827	1	TPOT GF06P 500KOHM
UP-7635	VR254	4160667	1	TPOT GF06P 20KOHM
UP-7635	VR255	4160604	1	TPOT GF06P 5KOHM
UP-7635	VR381	4160827	1	TPOT GF06P 500KOHM
UP-7635	X100	1750927	1	XTAL TD308C(XCO-B)8MHZ
UP-7635	X151	1702597	1	XTAL KF38G 32.768KHZ
UP-7635	ZD250	1253519	1	REG LT1009CZ 2.5VREF
UP-7635	ZD251	1090329	1	ZD2 HZ6C1 6V

UP-7636 HIGH VOLTAGE BD

UP-7636		5491361	1	CHEM HEAT SINK SHEET TO-3P2 TC30AG(F-1)
UP-7636	CNJ501	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-7636	CNJ511	5414864	1	NCN 350543-1 4P
UP-7636	CNJ515	5424024	1	NCN 171825-2 Receptacle Male
UP-7636	CNJ525	5424033	1	NCN 171825-3 Receptacle Male
UP-7636	CNJ535	5427734	1	PCN 170267-1
UP-7636	CNJ545	5427734	1	PCN 170267-1
UP-7636	CNJ555	5427681	1	PCN M60-03-30-134
UP-7636	C500	3851146	1	CEC2 DD05B471K500 500V470pF
UP-7636	C501	3800469	1	EC04 ECEA1HS010 50V1uF

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7636	C502	3839605	1	FLC1 ECQ-B1H472JZ 0.0047uF
UP-7636	C503	3801245	1	EC04 ECEA1VU 102
UP-7636	C504	3800193	1	EC04 ECEA1CS100 16V10uF
UP-7636	C505	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF
UP-7636	C506	3800237	1	EC04 ECEA1CS221 16V220uF
UP-7636	C507	3801414	1	EC04 ECES1EU682G 25V6800uF
UP-7636	C509	3800469	1	EC04 ECEA1HS010 50V1uF
UP-7636	C510	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF
UP-7636	C514	3859147	1	CEC2 10MDQ222M
UP-7636	C515	3839605	1	FLC1 ECQ-B1H472JZ 0.0047uF
UP-7636	C516	3839819	1	FLC1 ECQ-V1H334JZ 0.33uF
UP-7636	C517-C520	3839757	4	FLC1 ECQ-V1H104JZ 0.1uF
UP-7636	C721	3839641	1	FLC1 ECQ-B1H103JZ 0.01uF
UP-7636	C722-C723	3810502	2	TC04 ECSZ35HS6R8(242M3502-685M
UP-7636	C724	3839703	1	FLC1 ECQ-V1H333JZ 0.033uF
UP-7636	C725	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-7636	D500-D502	4322528	3	D 1S2076ARE
UP-7636	D503-D504	0910008	2	DP SR1FM8 800mA 400V
UP-7636	D506-D509	4322528	4	D 1S2076ARE
UP-7636	D510-D513	1101006	4	DP RC2 2007A 2KV
UP-7636	D515	0910008	1	DP SR1FM8 800mA 400V
UP-7636	D517	0910008	1	DP SR1FM8 800mA 400V
UP-7636	D518-D522	4322528	5	D 1S2076ARE
UP-7636	D720-D721	4322528	2	D 1S2076ARE
UP-7636	IC501	1253047	1	REG TL494CN SW REG
UP-7636	IC502	1300112	1	MIC MC14001UBCP (CD4001UBE)
UP-7636	IC503	1300638	1	MIC HD14053BP(MC14053BCP)
UP-7636	IC504	1253109	1	OPIC uPC358C DUAL
UP-7636	IC505	1253706	1	REG HA17806P Regulator
UP-7636	IC506	1252449	1	REG MC7906CT
UP-7636	IC720	1253715	1	OPIC uPC812C(LF412CN)2FET
UP-7636	L501-L502	3788009	2	L LF1-101K
UP-7636	Q500	0400568	1	TRD 2SD1271
UP-7636	Q501	0200499	1	TRB 2SB946
UP-7636	Q502	0400621	1	TRD 2SD1038
UP-7636	Q503	0400434	1	TRD 2SD571 L or M
UP-7636	Q504-Q506	0300596	3	TRC 2SC1345K-D(2SC1707H-C)
UP-7636	Q507	0200499	1	TRB 2SB946
UP-7636	RLY501	3430707	1	RY HV Relay NKR-102 8KV 80mA
UP-7636	T500	3790167	1	FBTF T-3790167 HV-DD
UP-7636	VR500	4160667	1	TPOT GF06P 20KOHM
UP-7636	VR501	4160658	1	TPOT GF06P 500 OHM
UP-7636	VR720	4160685	1	TPOT GF06P 100KOHM

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION	
UP-7636	VR721	4160613	1	TPOT	GF06P 10KOHM

UP-7638 FRONT PANEL BD

UP-7638		5415551	2	NCN	Pin 170204-2
UP-7638		5424078	1	NCN	171822-2 PLUG FEMALE
UP-7638	CNJ750	5422276	1	PCN	HKP-14MS-7BT
UP-7638	CNJ751	5427957	1	PCN	HIF3F34PA-2.5DS
UP-7638	CNJ752	5427645	1	PCN	M60-06-30-114P STRAIGHT
UP-7638	CNJ753	5427752	1	PCN	FH3-10S-1.25DS
UP-7638	CNP752	5427609	1	PCN	M62-06-0004SA (30)
UP-7638	C750	3800415	1	EC04	ECEA1VS101 35V100uF
UP-7638	C751	3800219	1	EC04	ECEA1CS470 16V47uF
UP-7638	C752	3820768	1	FLC1	454M6302 104K
UP-7638	DA750	0950571	1	D	MA430
UP-7638	IC750	1203975	1	TR	TD62004P
UP-7638	IC751	1205759	1	TIC	SN74LS07
UP-7638	LED750	1102139	1	LED	TLY 253 Yellow
UP-7638	LED751	1102148	1	LED	TLO 253 Orange
UP-7638	LED752-LED753	1102121	2	LED	TLG 253 Green
UP-7638	LED754	1102139	1	LED	TLY 253 Yellow
UP-7638	LED755-LED756	1102121	2	LED	TLG 253 Green
UP-7638	RA751	4093196	1	RM	EXB-F8V 103J 10K
UP-7638	RA752	4093365	1	RM	EXB-F8V-391J
UP-7638	RA753	4090831	1	RM	EXB-T44-102J
UP-7638	RA754	4093374	1	RM	EXB-F8V-223J
UP-7638	SW750-SW751	3280272	2	SW	KHC-10903
UP-7638	SW752	3352524	1	DSW	SRRS 1-18
UP-7638	TR750-TR757	0200507	8	TRB	2SB561C

UP-7639 VR AND CONNECTOR BD

UP-7639	CNJ702-CNJ703	5430721	2	CN	LGY 6501-0101
UP-7639	CNP011	5427431	1	PCN	M62-12-0017SA (30)
UP-7639	VR701	4161523	1	TVR2	RV16YP15S 500K OHM
UP-7639	VR702	4161532	1	TVR2	RV16YP15S 100 OHM

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

UP-7640 SW REGULATOR

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7640		5415836	2	NCN 5167PBTL
UP-7640		5601314	4	SOKT F4034P FUSE HOLDER
UP-7640		5601323	2	SOKT RT807
UP-7640	CNJ801	5428065	1	PCN 5281-03A 3P
UP-7640	CNJ802-CNJ803	5427734	2	PCN 170267-1
UP-7640	CNJ804	5425139	1	PCN HKP-22MS-11BT
UP-7640	CNJ805	5414864	1	NCN 350543-1 4P
UP-7640	CNJ806-CNJ807	5427734	2	PCN 170267-1
UP-7640	CNJ808	5424024	1	NCN 171825-2 Receptacle Male
UP-7640	CNJ809	5424033	1	NCN 171825-3 Receptacle Male
UP-7640	CNP801	5428074	1	PCN 5258-03 3P
UP-7640	CNP802	5500922	1	CORD 170187-2 (300) Red
UP-7640	CNP804	5424924	1	PCN HKP22FS02-11BT(20)
UP-7640	CNP805	5500967	1	CORD 1-480722-0 (350)
UP-7640	CN801	1601866	1	TH SUP-B3G-E-2A LINEFILTER
UP-7640	C801-C802	3820901	2	FLC2 ECQ-U2A224MN
UP-7640	C803-C804	3801601	2	EC04 KM200VRSN560-35C
UP-7640	C805	3820893	1	FLC DAD2E 105K
UP-7640	C806	3801593	1	EC04 KME25VB47 25/47
UP-7640	C807	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7640	C808	3801495	1	EC04 KME35VB470 35/470
UP-7640	C809	3853304	1	CEC2 ECK-D3D102KBN 1000pF 2KV
UP-7640	C810-C812	3801486	3	EC04 KME25VB2200 25/2200
UP-7640	C813	3801512	1	EC04 ECEA1HG010S 50V1uF
UP-7640	C814-C815	3801593	2	EC04 KME25VB47 25/47
UP-7640	C816	3820884	1	FLC QYA 2A103K
UP-7640	C817	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7640	C818-C820	3801619	3	EC04 KME16VB1000 16/1000
UP-7640	C821	3801459	1	EC04 KME25VB-1000 1000uF
UP-7640	C822-C828	3801593	7	EC04 KME25VB47 25/47
UP-7640	C829	3801495	1	EC04 KME35VB470 35/470
UP-7640	C830	3801486	1	EC04 KME25VB2200 25/2200
UP-7640	C831	3801593	1	EC04 KME25VB47 25/47
UP-7640	C832	3801628	1	EC04 KME35VB1000 35/1000
UP-7640	C833-C834	3820884	2	FLC QYA 2A103K
UP-7640	C835	3801593	1	EC04 KME25VB47 25/47
UP-7640	C836	3820884	1	FLC QYA 2A103K
UP-7640	C837	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF
UP-7640	C838	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7640	C839	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION	
UP-7640	D801	0940484	1	DB	S4VB60
UP-7640	D802	1000525	1	ZD2	HZ12LB-2 (12.85V)
UP-7640	D803-D804	0910659	2	DP	V19G (1.0A 600V)
UP-7640	D805-D808	0910597	4	DP	V19C (1A200V 200NS)
UP-7640	D809	0940475	1	DB	S24LCA20
UP-7640	D810	1090187	1	ZD2	HZ9LC1
UP-7640	D811	0910597	1	DP	V19C (1A200V 200NS)
UP-7640	D812-D813	0800617	2	DP	1SS81
UP-7640	D814-D825	0910597	12	DP	V19C (1A200V 200NS)
UP-7640	D826	0800617	1	DP	1SS81
UP-7640	D827-D829	0800626	3	D	U19C
UP-7640	D830	0800617	1	DP	1SS81
UP-7640	D831	0910659	1	DP	V19G (1.0A 600V)
UP-7640	D832-D835	0800617	4	DP	1SS81
UP-7640	D836	1090258	1	ZD2	HZ6LB1
UP-7640	D837	0800617	1	DP	1SS81
UP-7640	FH801-FH802	5625396	2	FH	FEU 031.1681
UP-7640	F803-F806	5620846	4	FUSE	MC-3 (3A125V)
UP-7640	F807-F808	5620659	2	FUSE	F-1065 15A
UP-7640	IC801-IC802	1601893	2	MD	SWC-01
UP-7640	IC803	1302315	1	MIC	HD14011BP(MC14011BCP)
UP-7640	IC804	1302298	1	MIC	HD14001BP(MC14001BCP)
UP-7640	IC805	1250219	1	REG	HA17723 (723CJ.Yellow)
UP-7640	IC806	1251316	1	OPIC	uPC271C
UP-7640	IC807	1253706	1	REG	HA17806P Regulator
UP-7640	IC808	1252449	1	REG	MC7906CT
UP-7640	IC809	1253822	1	REG	HA178M12
UP-7640	L801-L802	3751183	2	CH	SKP-5-80
UP-7640	L803	3750986	1	CH	LH3-332K (3.3mH)
UP-7640	L804	3751192	1	CH	SKL-204
UP-7640	L805-L807	3751165	3	CH	LH3 102K 1000uH
UP-7640	L808	3751174	1	CH	LH3 222K 2200uH
UP-7640	L809-L810	3799505	2	L	LH5-102K 1mH
UP-7640	L812-L813	3788811	2	L	2643-000301
UP-7640	Q801	0400648	1	TRD	2SD799
UP-7640	Q802-Q803	0302504	2	TRC	2SC4237
UP-7640	Q804-Q805	0101445	2	TRA	2SA1020
UP-7640	Q806	0302433	1	TRC	2SC2324K
UP-7640	Q807-Q808	0101454	2	TRA	2SA1293
UP-7640	Q809	0101151	1	TRA	2SA1194K HFE;1000
UP-7640	Q810	0301853	1	TRC	2SC1815
UP-7640	Q811	0302219	1	TRC	2SC2562 O or Y
UP-7640	Q812	0101196	1	TRA	2SA1015

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7640	Q813	0950598	1	SCK SF0R1B42 (0.1A100V)
UP-7640	RY801-RY802	3400277	2	RY MC12D1-0
UP-7640	R805	4093525	1	RM RGD5-2 470OHM
UP-7640	SW801	3250367	1	SW JPZ2120-0101
UP-7640	TH801-TH802	1705932	2	TH 5D-11
UP-7640	TH803	1705941	1	TH 2KD-5 25 C 2K
UP-7640	T801	3772294	1	PLTF PT7331A
UP-7640	T802	3772302	1	PLTF PT7332
UP-7640	T803-T804	3772311	2	PLTF PT7333
UP-7640	VR801	4160604	1	TPOT GF06P 5KOHM
UP-7640	VR802	4160792	1	TPOT GF06P 200 OHM
UP-7640	VR803	4160596	1	TPOT GF06P 1KOHM
UP-7640	VR804	4160792	1	TPOT GF06P 200 OHM
UP-7640	VR805-VR806	4160613	2	TPOT GF06P 10KOHM

UP-7682 DIP SW BD

UP-7682		5430721	1	CN LGY 6501-0101
UP-7682	CNP001	5427431	1	PCN M62-12-0017SA (30)
UP-7682	C700	3839641	1	FLC1 ECQ-B1H103JZ 0.01uF
UP-7682	SW701	3250376	1	SW BP-8 8DIP

UP-7720 SW REGULATOR

UP-7720		5415836	2	NCN 5167PBTL
UP-7720		5601314	4	SOKT F4034P FUSE HOLDER
UP-7720		5601323	2	SOKT RT807
UP-7720	CNJ801	5428065	1	PCN 5281-03A 3P
UP-7720	CNJ802-CNJ803	5427734	2	PCN 170267-1
UP-7720	CNJ804	5425139	1	PCN HKP-22MS-11BT
UP-7720	CNJ805	5414864	1	NCN 350543-1 4P
UP-7720	CNJ806-CNJ807	5427734	2	PCN 170267-1
UP-7720	CNJ808	5424024	1	NCN 171825-2 Receptacle Male
UP-7720	CNJ809	5424033	1	NCN 171825-3 Receptacle Male
UP-7720	CNP801	5428074	1	PCN 5258-03 3P
UP-7720	CNP802	5500922	1	CORD 170187-2 (300) Red
UP-7720	CNP804	5424924	1	PCN HKP22FS02-11BT(20)

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7720	CNP805	5500967	1	CORD 1-480722-0 (350)
UP-7720	CN801	1601866	1	TH SUP-B3G-E-2A LINEFILTER
UP-7720	C801-C802	3820901	2	FLC2 ECQ-U2A224MN
UP-7720	C803-C804	3801601	2	EC04 KM200VRSN560-35C
UP-7720	C805	3820893	1	FLC DAD2E 105K
UP-7720	C806	3801593	1	EC04 KME25VB47 25/47
UP-7720	C807	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7720	C808	3801495	1	EC04 KME35VB470 35/470
UP-7720	C809	3853304	1	CEC2 ECK-D3D102KBN 1000pF 2KV
UP-7720	C810-C812	3801486	3	EC04 KME25VB2200 25/2200
UP-7720	C813	3801512	1	EC04 ECEA1HG010S 50V1uF
UP-7720	C814-C815	3801593	2	EC04 KME25VB47 25/47
UP-7720	C816	3820884	1	FLC QYA 2A103K
UP-7720	C817	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7720	C818-C820	3801619	3	EC04 KME16VB1000 16/1000
UP-7720	C821	3801459	1	EC04 KME25VB-1000 1000uF
UP-7720	C822-C828	3801593	7	EC04 KME25VB47 25/47
UP-7720	C829	3801495	1	EC04 KME35VB470 35/470
UP-7720	C830	3801486	1	EC04 KME25VB2200 25/2200
UP-7720	C831	3801593	1	EC04 KME25VB47 25/47
UP-7720	C832	3801628	1	EC04 KME35VB1000 35/1000
UP-7720	C833-C834	3820884	2	FLC QYA 2A103K
UP-7720	C835	3801593	1	EC04 KME25VB47 25/47
UP-7720	C836	3820884	1	FLC QYA 2A103K
UP-7720	C837	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF
UP-7720	C838	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7720	C839	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF
UP-7720	C841	3820919	1	FLC QYA2A472K
UP-7720	C842	3820884	1	FLC QYA 2A103K
UP-7720	C843	3801593	1	EC04 KME25VB47 25/47
UP-7720	D801	0940484	1	DB S4VB60
UP-7720	D802	1000525	1	ZD2 HZ12LB-2 (12.85V)
UP-7720	D803-D804	0910659	2	DP V19G (1.0A 600V)
UP-7720	D805-D808	0910597	4	DP V19C (1A200V 200NS)
UP-7720	D809	0940475	1	DB S24LCA20
UP-7720	D810	1090187	1	ZD2 HZ9LC1
UP-7720	D811	0910597	1	DP V19C (1A200V 200NS)
UP-7720	D812-D813	0800617	2	DP 1SS81
UP-7720	D814-D825	0910597	12	DP V19C (1A200V 200NS)
UP-7720	D826	0800617	1	DP 1SS81
UP-7720	D827-D829	0800626	3	D U19C
UP-7720	D830	0800617	1	DP 1SS81
UP-7720	D831	0910659	1	DP V19G (1.0A 600V)

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION	
UP-7720	D832-D835	0800617	4	DP	1SS81
UP-7720	D836	1090258	1	ZD2	HZ6LB1
UP-7720	D837	0800617	1	DP	1SS81
UP-7720	FH801-FH802	5625396	2	FH	FEU 031.1681
UP-7720	F803-F806	5620846	4	FUSE	MC-3 (3A125V)
UP-7720	F807-F808	5620659	2	FUSE	F-1065 15A
UP-7720	IC801-IC802	1601893	2	MD	SWC-01
UP-7720	IC803	1302315	1	MIC	HD14011BP(MC14011BCP)
UP-7720	IC804	1302298	1	MIC	HD14001BP(MC14001BCP)
UP-7720	IC805	1250219	1	REG	HA17723 (723CJ.G)
UP-7720	IC806	1251316	1	OPIC	uPC271C
UP-7720	IC807	1253706	1	REG	HA17806P Regulator
UP-7720	IC808	1252449	1	REG	MC7906CT
UP-7720	IC809	1253822	1	REG	HA178M12
UP-7720	L801-L802	3751183	2	CH	SKP-5-80
UP-7720	L803	3750986	1	CH	LH3-332K (3.3mH)
UP-7720	L804	3751192	1	CH	SKL-204
UP-7720	L805-L807	3751165	3	CH	LH3 102K 1000uH
UP-7720	L808	3751174	1	CH	LH3 222K 2200uH
UP-7720	L809-L810	3799505	2	L	LH5-102K 1mH
UP-7720	L811	3788829	1	L	BL02RN2-R62
UP-7720	L812-L813	3788811	2	L	2643-000301
UP-7720	L814-L815	3788829	2	L	BL02RN2-R62
UP-7720	Q801	0400648	1	TRD	2SD799
UP-7720	Q802-Q803	0302255	2	TRC	2SC2792
UP-7720	Q804-Q805	0101445	2	TRA	2SA1020
UP-7720	Q806	0302433	1	TRC	2SC2324K
UP-7720	Q807-Q808	0101454	2	TRA	2SA1293
UP-7720	Q809	0101151	1	TRA	2SA1194K HFE;1000
UP-7720	Q810	0301853	1	TRC	2SC1815
UP-7720	Q811	0302219	1	TRC	2SC2562 O or Y
UP-7720	Q812	0101196	1	TRA	2SA1015
UP-7720	Q813	0950598	1	SCR	SF0R1B42 (0.1A100V)
UP-7720	RY801-RY802	3400277	2	RY	MC12D1-0
UP-7720	R805	4093525	1	RM	RGD5-2 470OHM
UP-7720	SW801	3250367	1	SW	JPZ2120-0101
UP-7720	TH801-TH802	1705932	2	TH	5D-11
UP-7720	TH803	1705941	1	TH	2KD-5 25 C 2K
UP-7720	T801	3772347	1	T	PT36271A
UP-7720	T802	3772302	1	PLTF	PT7332
UP-7720	T803-T804	3772311	2	PLTF	PT7333
UP-7720	VR801	4160604	1	TPOT	GF06P 5KOHM
UP-7720	VR802	4160792	1	TPOT	GF06P 200 OHM

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7720	VR803	4160596	1	TPOT GF06P 1KOHM
UP-7720	VR804	4160792	1	TPOT GF06P 200 OHM
UP-7720	VR805-VR806	4160613	2	TPOT GF06P 10KOHM
UP-7720	VR807	4160676	1	TPOT GF06P 50KOHM

UP-7720G SW REGULATOR

UP-7720G		5415836	2	NCN 5167PBTL
UP-7720G		5601314	4	SOKT F4034P FUSE HOLDER
UP-7720G		5601323	2	SOKT RT807
UP-7720G	CNJ801	5428065	1	PCN 5281-03A 3P
UP-7720G	CNJ802-CNJ803	5427734	2	PCN 170267-1
UP-7720G	CNJ804	5425139	1	PCN HKP-22MS-11BT
UP-7720G	CNJ805	5414864	1	NCN 350543-1 4P
UP-7720G	CNJ806-CNJ807	5427734	2	PCN 170267-1
UP-7720G	CNJ808	5424024	1	NCN 171825-2 Receptacle Male
UP-7720G	CNJ809	5424033	1	NCN 171825-3 Receptacle Male
UP-7720G	CNP801	5428074	1	PCN 5258-03 3P
UP-7720G	CNP802	5500922	1	CORD 170187-2 (300) Red
UP-7720G	CNP804	5424924	1	PCN HKP22FS02-11BT(20)
UP-7720G	CNP805	5500967	1	CORD 1-480722-0 (350)
UP-7720G	CN801	1601866	1	TH SUP-B3G-E-2A LINEFILTER
UP-7720G	C801-C802	3820901	2	FLC2 ECQ-U2A224MN
UP-7720G	C803-C804	3801601	2	EC04 KM200VRSN560-35C
UP-7720G	C805	3820893	1	FLC DAD2E 105K
UP-7720G	C806	3801593	1	EC04 KME25VB47 25/47
UP-7720G	C807	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7720G	C808	3801495	1	EC04 KME35VB470 35/470
UP-7720G	C809	3853304	1	CEC2 ECK-D3D102KBN 1000pF 2KV
UP-7720G	C810-C812	3801486	3	EC04 KME25VB2200 25/2200
UP-7720G	C813	3801512	1	EC04 ECEA1HG010S 50V1uF
UP-7720G	C814-C815	3801593	2	EC04 KME25VB47 25/47
UP-7720G	C816	3820884	1	FLC QYA 2A103K
UP-7720G	C817	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7720G	C818-C820	3801619	3	EC04 KME16VB1000 16/1000
UP-7720G	C821	3801459	1	EC04 KME25VB-1000 1000uF
UP-7720G	C822-C828	3801593	7	EC04 KME25VB47 25/47
UP-7720G	C829	3801495	1	EC04 KME35VB470 35/470
UP-7720G	C830	3801486	1	EC04 KME25VB2200 25/2200
UP-7720G	C831	3801593	1	EC04 KME25VB47 25/47

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7720G	C832	3801628	1	EC04 KME35VB1000 35/1000
UP-7720G	C833-C834	3820884	2	FLC QYA 2A103K
UP-7720G	C835	3801593	1	EC04 KME25VB47 25/47
UP-7720G	C836	3820884	1	FLC QYA 2A103K
UP-7720G	C837	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF
UP-7720G	C838	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7720G	C839	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF
UP-7720G	C841	3820919	1	FLC QYA2A472K
UP-7720G	C842	3820884	1	FLC QYA 2A103K
UP-7720G	C843	3801593	1	EC04 KME25VB47 25/47
UP-7720G	D801	0940484	1	DB S4VB60
UP-7720G	D802	1000525	1	ZD2 HZ12LB-2 (12.85V)
UP-7720G	D803-D804	0910659	2	DP V19G (1.0A 600V)
UP-7720G	D805-D808	0910597	4	DP V19C (1A200V 200NS)
UP-7720G	D809	0940475	1	DB S24LCA20
UP-7720G	D810	1090187	1	ZD2 HZ9LC1
UP-7720G	D811	0910597	1	DP V19C (1A200V 200NS)
UP-7720G	D812-D813	0800617	2	DP 1SS81
UP-7720G	D814-D825	0910597	12	DP V19C (1A200V 200NS)
UP-7720G	D826	0800617	1	DP 1SS81
UP-7720G	D827-D829	0800626	3	D U19C
UP-7720G	D830	0800617	1	DP 1SS81
UP-7720G	D831	0910659	1	DP V19G (1.0A 600V)
UP-7720G	D832-D835	0800617	4	DP 1SS81
UP-7720G	D836	1090258	1	ZD2 HZ6LB1
UP-7720G	D837	0800617	1	DP 1SS81
UP-7720G	D838	1090258	1	ZD2 HZ6LB1
UP-7720G	FH801-FH802	5625396	2	FH FEU 031.1681
UP-7720G	F803-F806	5620846	4	FUSE MC-3 (3A125V)
UP-7720G	F807-F808	5620659	2	FUSE F-1065 15A
UP-7720G	IC801-IC802	1601893	2	MD SWC-01
UP-7720G	IC803	1302315	1	MIC HD14011BP(MC14011BCP)
UP-7720G	IC804	1302298	1	MIC HD14001BP(MC14001BCP)
UP-7720G	IC805	1250219	1	REG HA17723 (723CJ.G)
UP-7720G	IC806	1251316	1	OPIC uPC271C
UP-7720G	IC807	1253706	1	REG HA17806P Regulator
UP-7720G	IC808	1252449	1	REG MC7906CT
UP-7720G	IC809	1253822	1	REG HA178M12
UP-7720G	IC810	1252262	1	AIC uPC393C (LM393N)
UP-7720G	L801-L802	3751183	2	CH SKP-5-80
UP-7720G	L803	3750986	1	CH LH3-332K (3.3mH)
UP-7720G	L804	3751192	1	CH SKL-204
UP-7720G	L805-L807	3751165	3	CH LH3 102K 1000uH

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION
UP-7720G	L808	3751174	1	CH	LH3 222K 2200uH
UP-7720G	L809-L810	3799505	2	L	LH5-102K 1mH
UP-7720G	L811	3788829	1	L	BL02RN2-R62
UP-7720G	L812-L813	3788811	2	L	2643-000301
UP-7720G	L814-L815	3788829	2	L	BL02RN2-R62
UP-7720G	Q801	0400648	1	TRD	2SD799
UP-7720G	Q802-Q803	0302504	2	TRC	2SC4237
UP-7720G	Q804-Q805	0101445	2	TRA	2SA1020
UP-7720G	Q806	0302433	1	TRC	2SC2324K
UP-7720G	Q807-Q808	0101454	2	TRA	2SA1293
UP-7720G	Q809	0101151	1	TRA	2SA1194K HFE;1000
UP-7720G	Q810	0301853	1	TRC	2SC1815
UP-7720G	Q811	0302219	1	TRC	2SC2562 O or Y
UP-7720G	Q812	0101196	1	TRA	2SA1015
UP-7720G	Q813	0950598	1	SCR	SFOR1B42 (0.1A100V)
UP-7720G	Q814	0101196	1	TRA	2SA1015
UP-7720G	RY801-RY802	3400277	2	RY	MC12D1-0
UP-7720G	R805	4093525	1	RM	RGD5-2 470ohm
UP-7720G	SW801	3250367	1	SW	JPZ2120-0101
UP-7720G	TH801-TH802	1705932	2	TH	5D-11
UP-7720G	TH803	1705941	1	TH	2KD-5 25 C 2K
UP-7720G	T801	3772347	1	T	PT36271A
UP-7720G	T802	3772302	1	PLTF	PT7332
UP-7720G	T803-T804	3772311	2	PLTF	PT7333
UP-7720G	VR801	4160604	1	TPOT	GF06P 5KOHM
UP-7720G	VR802	4160792	1	TPOT	GF06P 200 OHM
UP-7720G	VR803	4160596	1	TPOT	GF06P 1KOHM
UP-7720G	VR804	4160792	1	TPOT	GF06P 200 OHM
UP-7720G	VR805-VR806	4160613	2	TPOT	GF06P 10KOHM
UP-7720G	VR807	4160827	1	TPOT	GF06P 500KOHM

UP-7737 ECG/CPU BD

UP-7737	CNJ100	5427663	1	PCN	M60-12-30-114P STRAIGHT
UP-7737	CNJ105	5427672	1	PCN	M60-15-30-114P STRAIGHT
UP-7737	CNJ106	5427173	1	PCN	HIF3F-40PADSA 40P
UP-7737	CNJ108	5425139	1	PCN	HKP-22MS-11BT
UP-7737	CNJ110	5427663	1	PCN	M60-12-30-114P STRAIGHT
UP-7737	CNJ116	5427663	1	PCN	M60-12-30-114P STRAIGHT

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7737	CNJ157	5427743	1	PCN HIF3F-34PA-2.54DSA
UP-7737	CNJ303	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-7737	CNJ355	5427636	1	PCN M60-03-30-114P STRAIGHT
UP-7737	C100-C101	3820768	2	FLC1 454M6302 104K
UP-7737	C103-C109	3820768	7	FLC1 454M6302 104K
UP-7737	C111-C113	3820768	3	FLC1 454M6302 104K
UP-7737	C120	3800469	1	EC04 ECEA1HS010 50V1uF
UP-7737	C121	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-7737	C122	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF
UP-7737	C123	3800469	1	EC04 ECEA1HS010 50V1uF
UP-7737	C124	3839561	1	FLC1 ECQ-B1H222JZ 0.0022uF
UP-7737	C125-C126	3839793	2	FLC1 ECQ-V1H224JZ 0.22uF
UP-7737	C127	3800469	1	EC04 ECEA1HS010 50V1uF
UP-7737	C128	3839686	1	FLC1 ECQ-B1H223JZ 0.022uF
UP-7737	C129	3851137	1	CEC2 DD05B331K500 500V330pF
UP-7737	C130	3851119	1	CEC2 DD05B151K500 500V150pF
UP-7737	C201-C206	3820768	6	FLC1 454M6302 104K
UP-7737	C207-C210	3839641	4	FLC1 ECQ-B1H103JZ 0.01uF
UP-7737	C211-C218	3820768	8	FLC1 454M6302 104K
UP-7737	C220-C221	3820768	2	FLC1 454M6302 104K
UP-7737	C230-C231	3839525	2	FLC1 ECQ-B1H102JZ 0.001uF
UP-7737	C232	3800371	1	EC04 ECEA1VS100 35V10uF
UP-7737	C233	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-7737	C234	3839641	1	FLC1 ECQ-B1H103JZ 0.01uF
UP-7737	C241-C242	3839525	2	FLC1 ECQ-B1H102JZ 0.001uF
UP-7737	C243	3800371	1	EC04 ECEA1VS100 35V10uF
UP-7737	C250-C251	3839873	2	FLC1 ECQ-V1H105JZ 1.0uF
UP-7737	C252	3839721	1	FLC1 ECQ-V1H473JZ 0.047uF
UP-7737	C253	3851155	1	CEC2 DD06B681K500 500V680pF
UP-7737	C254	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF
UP-7737	C255	3820768	1	FLC1 454M6302 104K
UP-7737	C256	3839641	1	FLC1 ECQ-B1H103JZ 0.01uF
UP-7737	C257-C270	3820768	14	FLC1 454M6302 104K
UP-7737	C271-C272	3800219	2	EC04 ECEA1CS470 16V47uF
UP-7737	C273	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-7737	C274	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF
UP-7737	C275	3839721	1	FLC1 ECQ-V1H473JZ 0.047uF
UP-7737	C280	3820768	1	FLC1 454M6302 104K
UP-7737	C301-C304	3839525	4	FLC1 ECQ-B1H102JZ 0.001uF
UP-7737	C305	3839819	1	FLC1 ECQ-V1H334JZ 0.33uF
UP-7737	C306	3839641	1	FLC1 ECQ-B1H103JZ 0.01uF
UP-7737	C307	3800371	1	EC04 ECEA1VS100 35V10uF
UP-7737	C309-C310	3800371	2	EC04 ECEA1VS100 35V10uF

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7737	C311	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-7737	C312	3839739	1	FLC1 ECQ-V1H683JZ 0.068uF
UP-7737	C313-C314	3839819	2	FLC1 ECQ-V1H334JZ 0.33uF
UP-7737	C315-C316	3839757	2	FLC1 ECQ-V1H104JZ 0.1uF
UP-7737	C351-C352	3839641	2	FLC1 ECQ-B1H103JZ 0.01uF
UP-7737	C353	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-7737	C354	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-7737	C355-C356	3800371	2	EC04 ECEA1VS100 35V10uF
UP-7737	C401	3851119	1	CEC2 DD05B151K500 500V150pF
UP-7737	C402-C407	3820768	6	FLC1 454M6302 104K
UP-7737	DA101	0950571	1	D MA430
UP-7737	DA102	0950544	1	D MA423 Cathode common
UP-7737	DA103	0950553	1	D MA424 Anode common
UP-7737	DA104	0950544	1	D MA423 Cathode common
UP-7737	DA105	0950553	1	D MA424 Anode common
UP-7737	DA201	0950544	1	D MA423 Cathode common
UP-7737	DA202	0950553	1	D MA424 Anode common
UP-7737	DA231	0950553	1	D MA424 Anode common
UP-7737	DA232	0950544	1	D MA423 Cathode common
UP-7737	DA233	0950553	1	D MA424 Anode common
UP-7737	D100-D103	4322528	4	D 1S2076ARE
UP-7737	D106-D108	4322528	3	D 1S2076ARE
UP-7737	D201-D216	0800564	16	D 1SS237
UP-7737	D217-D218	4322528	2	D 1S2076ARE
UP-7737	D219	0800564	1	D 1SS237
UP-7737	D220-D231	4322528	12	D 1S2076ARE
UP-7737	D232	0800092	1	D 0A91(1S1005)
UP-7737	D241-D242	4322528	2	D 1S2076ARE
UP-7737	D253-D257	4322528	5	D 1S2076ARE
UP-7737	D258-D259	0800644	2	D 1SV126
UP-7737	D260-D261	4322528	2	D 1S2076ARE
UP-7737	D301-D302	4322528	2	D 1S2076ARE
UP-7737	D303-D304	1000258	2	ZD2 HZ9C1 500mW 9.2mA
UP-7737	D305-D314	0800644	10	D 1SV126
UP-7737	D351-D354	4322528	4	D 1S2076ARE
UP-7737	D355-D356	1000258	2	ZD2 HZ9C1 500mW 9.2mA
UP-7737	D357-D358	4322528	2	D 1S2076ARE
UP-7737	D401	4322528	1	D 1S2076ARE
UP-7737	GA351	2100335	1	GA B1C90 (90V)
UP-7737	ICS103	5422846	1	SOKT IC SOCKET DL-2-28A (01)
UP-7737	ICS107	5601279	1	SOKT 208-93-764 64PIC SOCKET
UP-7737	ICS201	5601279	1	SOKT 208-93-764 64PIC SOCKET
UP-7737	ICS203	5422846	1	SOKT IC SOCKET DL-2-28A (01)

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7737	ICS405	5601279	1	SOKT 208-93-764 64PIC SOCKET
UP-7737	ICS413	5422846	1	SOKT IC SOCKET DL-2-28A (01)
UP-7737	IC101	1205786	1	CPU uPD71055C(82C55A-2)
UP-7737	IC102	1302859	1	CPU uPD8279C-2
UP-7737	IC104	1207222	1	CPU DC-HOST (GAL 16V8-25LP)
UP-7737	IC105	1253403	1	AIC TL7700C
UP-7737	IC106	1303528	1	MIC uPD74HC123C(HD74HC123P)
UP-7737	IC107	1207721	1	CPU HD63C03Y (3MHZ)
UP-7737	IC108	1303074	1	MIC uPD74HC4040C(HD74HC4040P
UP-7737	IC109	1302948	1	MIC uPD74HC08C(HD74HC08P)
UP-7737	IC110	1302975	1	MIC HD74HC32P(uPD74HC32C)
UP-7737	IC112	1203752	1	TIC SN74LS365
UP-7737	IC114	1252752	1	OPIC HA17082PS 2FET
UP-7737	IC115	1302948	1	MIC uPD74HC08C(HD74HC08P)
UP-7737	IC116	1302912	1	MIC HD74HC00P(uPD74HC00C)
UP-7737	IC120	1206473	1	CPU MB84256-10LP-G
UP-7737	IC121	1302912	1	MIC HD74HC00P(uPD74HC00C)
UP-7737	IC201	1207721	1	CPU HD63C03Y (3MHZ)
UP-7737	IC202	1253501	1	ADIC uPD-7004C8CH10BITA/D
UP-7737	IC204	1206473	1	CPU MB84256-10LP-G
UP-7737	IC205	1303065	1	MIC HD74HC245P(uPD74HC245C)
UP-7737	IC206-IC207	1303056	2	MIC HD74HC244P(uPD74HC244C)
UP-7737	IC208	1302993	1	MIC HD74HC139P(uPD74HC139C)
UP-7737	IC209	1302939	1	MIC HD74HC04P(uPD74HC04C)
UP-7737	IC210	1302912	1	MIC HD74HC00P(uPD74HC00C)
UP-7737	IC211	1302975	1	MIC HD74HC32P(uPD74HC32C)
UP-7737	IC212	1303243	1	MIC HD74HC374P(uPD74HC374C)
UP-7737	IC230	1300629	1	MIC HD14052BP(MC14052BCP)
UP-7737	IC250	1300629	1	MIC HD14052BP(MC14052BCP)
UP-7737	IC251	1601875	1	MD NP2014B
UP-7737	IC252	1300611	1	MIC HD14051BP(MC14051BCP)
UP-7737	IC253	1300638	1	MIC HD14053BP(MC14053BCP)
UP-7737	IC254-IC255	1253118	2	OPIC uPC324C QUAD
UP-7737	IC256	1253715	1	OPIC uPC812C(LF412CN)2FET
UP-7737	IC257	1300638	1	MIC HD14053BP(MC14053BCP)
UP-7737	IC258	1253715	1	OPIC uPC812C(LF412CN)2FET
UP-7737	IC301-IC302	1252084	2	OPIC TL072CP
UP-7737	IC303-IC305	1300611	3	MIC HD14051BP(MC14051BCP)
UP-7737	IC306	1253724	1	OPIC uPC4570C
UP-7737	IC307	1251165	1	OPIC uPC1458C
UP-7737	IC308	1251904	1	AIC MB4204 (uPC339C)
UP-7737	IC309	1300629	1	MIC HD14052BP(MC14052BCP)
UP-7737	IC310	1251601	1	REG uPC78L05J (NJM78L05A)

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7737	IC311	1252494	1	REG uPC79L05J (NJM79L05A)
UP-7737	IC351	1252084	1	OPIC TL072CP
UP-7737	IC352	1300629	1	MIC HD14052BP(MC14052BCP)
UP-7737	IC401-IC402	1303056	2	MIC HD74HC244P(uPD74HC244C)
UP-7737	IC403	1303065	1	MIC HD74HC245P(uPD74HC245C)
UP-7737	IC404	1206473	1	CPU MB84256-10LP-G
UP-7737	IC405	1205768	1	CPU HD63B03XP
UP-7737	IC406	1251174	1	ADIC uPC624C (DAC-08CQ)
UP-7737	IC408	1300522	1	MIC HD14042BP (MC14042BCP)
UP-7737	IC409	1303546	1	MIC HD74HC151P (uPD74HC151C)
UP-7737	IC410	1303074	1	MIC uPD74HC4040C(HD74HC4040P
UP-7737	IC411	1302921	1	MIC uPD74HC02C(HD74HC02P)
UP-7737	IC412	1303412	1	MIC SN74HC03N(uPD74HC03C)
UP-7737	PC301	0600254	1	TRP PC837
UP-7737	PC302	1704345	1	TRP PC817 PHOTOCOUPLER
UP-7737	Q230-Q231	0300613	2	TRC 2SC1213AK-D(2SC1781H-B-C)
UP-7737	Q240-Q241	0300613	2	TRC 2SC1213AK-D(2SC1781H-B-C)
UP-7737	Q250	0100107	1	TRA 2SA495G-Y Yellow
UP-7737	Q251	0300613	1	TRC 2SC1213AK-D(2SC1781H-B-C)
UP-7737	Q252	0101124	1	TRA 2SA836 C or D
UP-7737	RA100	4090582	1	RM EXB-P84-103J
UP-7737	RA101	4090813	1	RM EXB-P88-103J
UP-7737	RA102	4090582	1	RM EXB-P84-103J
UP-7737	RA104	4090813	1	RM EXB-P88-103J
UP-7737	RA105-RA106	4091153	2	RM EXB-T44-101J
UP-7737	RA201-RA202	4092624	2	RM EXB-T44-472J 4.7 KOHM
UP-7737	RA203	4090822	1	RM EXB-P88-472J
UP-7737	RA204	4090787	1	RM EXB-P88-104J
UP-7737	RA206	4090813	1	RM EXB-P88-103J
UP-7737	RA230	4091884	1	RM EXB-P84-472J
UP-7737	RA301	4093338	1	RM CMR-042B 20.0K OHM
UP-7737	RA302	4093347	1	RM CMR-042A 30.1K OHM
UP-7737	RA303	4090689	1	RM EXB-P84-473J
UP-7737	RA304	4093356	1	RM EXB-F8V-154J
UP-7737	RA305-RA306	4091572	2	RM EXB-T44-103J
UP-7737	RA401	4092517	1	RM EXB-P88-332J 3.3 KOHMX8
UP-7737	SW102	3350838	1	DSW DSS102
UP-7737	T301	3772285	1	PLTF EP17 50KHZ SIG Yellow
UP-7737	T302	3772409	1	PLTF EP17 5V TO 7V Red
UP-7737	T351	3772258	1	PLTF EP13 50KHZ SIG Yellow
UP-7737	T352	3772276	1	PLTF EP13 50KHZ DC-DC Red
UP-7737	VR101	4160685	1	TPOT GF06P 100KOHM
UP-7737	VR251	4160596	1	TPOT GF06P 1KOHM

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7737	VR252	4160667	1	TPOT GF06P 20KOHM
UP-7737	VR253	4160827	1	TPOT GF06P 500KOHM
UP-7737	VR254	4160667	1	TPOT GF06P 20KOHM
UP-7737	VR255	4160604	1	TPOT GF06P 5KOHM
UP-7737	X100	1750927	1	XTAL TD308C(XCO-B)8MHZ
UP-7737	X200	1706004	1	XTAL TD 308C XCO-B 12MHZ
UP-7737	ZD250	1253519	1	REG LT1009CZ 2.5VREF
UP-7737	ZD251	1090329	1	ZD2 HZ6C1 6V
UP-7737	ZD252	1000534	1	ZD1 HZ3B-2 500mW 3.0V
UP-7737	CNJ101	5445474	1	PCN IL-2P-S3FP2-1
UP-7737	C151	3851066	1	CEC2 DD05SL220K500 500V22pF
UP-7737	C152	3890353	1	ECR-GA035M11-35pF
UP-7737	C153	3839837	1	FLC1 ECQ-V1H474JZ 0.47uF
UP-7737	C381-C382	3839793	2	FLC1 ECQ-V1H224JZ 0.22uF
UP-7737	C383	3810832	1	TC04 204M3502 105M4 (1uF/35V)
UP-7737	C384	3839721	1	FLC1 ECQ-V1H473JZ 0.047uF
UP-7737	C385	3839703	1	FLC1 ECQ-V1H333JZ 0.033uF
UP-7737	C386-C387	3820768	2	FLC1 454M6302 104K
UP-7737	D151-D153	4322528	3	D 1S2076ARE
UP-7737	D381-D382	4322528	2	D 1S2076ARE
UP-7737	IC151	1303662	1	CPU MSM6242 RS
UP-7737	IC380	1300638	1	MIC HD14053BP(MC14053BCP)
UP-7737	IC381	1252752	1	OPIC HA17082PS 2FET
UP-7737	T381	3772258	1	PLTF EP13 50KHZ SIG Yellow
UP-7737	VR381	4160827	1	TPOT GF06P 500KOHM
UP-7737	X151	1702597	1	XTAL KF38G 32.768KHZ

UP-7738 MOTOR CONTROL BD

UP-7738	CNJ700	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-7738	CNJ706	5427663	1	PCN M60-12-30-114P STRAIGHT
UP-7738	CNJ710	5423195	1	PCN HKP-20MS-10BT
UP-7738	CNJ716	5427636	1	PCN M60-03-30-114P STRAIGHT
UP-7738	C700-C701	3800371	2	EC04 ECEA1VS100 35V10uF
UP-7738	C702	3839721	1	FLC1 ECQ-V1H473JZ 0.047uF
UP-7738	C703	3800371	1	EC04 ECEA1VS100 35V10uF
UP-7738	C704	3820001	1	FLC1 MFL5002-102K 50V0.001uF
UP-7738	C705	3801405	1	EC04 ECES1CV153S
UP-7738	C706	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7738	C707	3800201	1	EC04 ECEA1CS220 16V22uF
UP-7738	C708	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF
UP-7738	C711	3810502	1	TC04 ECSZ35HS6R8(242M3502-685M
UP-7738	C712	3800389	1	EC04 ECEA1VS220 35V22uF
UP-7738	C713	3800219	1	EC04 ECEA1CS470 16V47uF
UP-7738	C714-C715	3839757	2	FLC1 ECQ-V1H104JZ 0.1uF
UP-7738	C716	3810877	1	TC04 204M3502 475M4(4.7uF/35V)
UP-7738	C717	3839819	1	FLC1 ECQ-V1H334JZ 0.33uF
UP-7738	D700	1000383	1	ZD1 HZ3C3 500mW 3.3V
UP-7738	D704-D705	0800172	2	D 1S2076A(1S953(3)1S954)
UP-7738	IC700	1252262	1	AIC uPC393C (LM393N)
UP-7738	IC701	1251512	1	REG HA178M05
UP-7738	IC702	1300567	1	MIC HD14046BP(MC14046BCP)
UP-7738	IC703	1251601	1	REG uPC78L05J (NJM78L05A)
UP-7738	IC704	1250148	1	OPIC HA17741 PS(GS)(741T,C151)
UP-7738	IC705	1300638	1	MIC HD14053BP(MC14053BCP)
UP-7738	L701	3788063	1	L LF1-101K 100uH
UP-7738	Q700-Q703	0300596	4	TRC 2SC1345K-D(2SC1707H-C)
UP-7738	Q704	0100107	1	TRA 2SA495G-Y Yellow
UP-7738	Q705	0400488	1	TRD 2SD768K with SK16B YC40B
UP-7738	Q706	0100107	1	TRA 2SA495G-Y Yellow
UP-7738	SW700	3350838	1	DSW DSS102
UP-7738	VR700	4160925	1	TPOT GF-06S(ET-6S) 20KOHM
UP-7738	VR701	4160952	1	TPOT GF-06S(ET-6S) 2KOHM
UP-7738	VR702	4160925	1	TPOT GF-06S(ET-6S) 20KOHM
UP-7738	VR703	4160997	1	TPOT GF-06S(ET-6S)100KOHM

UP-7740 CRT DRIVER

UP-7740	AR601-AR602	1704559	2	TH T08-230B Arrestor
UP-7740	CNJ600	5422338	1	PCN HKP-10M5S-9T
UP-7740	CNJ607	5427716	1	PCN M60-12-30-134
UP-7740	CNJ610	5420982	1	ACN2 A3-705B-00P 3P MALE 3Q
UP-7740	CNJ617	5427681	1	PCN M60-03-30-134
UP-7740	CNJ620	5427654	1	PCN M60-09-30-114P STRAIGHT
UP-7740	CNJ630	5427725	1	PCN M60-15-30-134
UP-7740	C601	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF
UP-7740	C603	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-7740	C604	3839561	1	FLC1 ECQ-B1H222JZ 0.0022uF

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7740	C605	3851128	1	CEC2 DD05B221K500 500V220pF
UP-7740	C610	3839837	1	FLC1 ECQ-V1H474JZ 0.47uF
UP-7740	C611-C612	3810502	2	TC04 ECSZ35HS6R8(242M3502-685M
UP-7740	C613-C614	3800219	2	EC04 ECEA1CS470 16V47uF
UP-7740	C615-C616	3820028	2	FLC1 MFL5002-222K 50V0.0022uF
UP-7740	C618-C619	3800219	2	EC04 ECEA1CS470 16V47uF
UP-7740	C620-C625	3820768	6	FLC1 454M6302 104K
UP-7740	C626-C627	3800406	2	EC04 ECEA1HS470 50V47uF
UP-7740	C630-C631	3800228	2	EC04 ECEA1CS101 16V100uF
UP-7740	C632	3800371	1	EC04 ECEA1VS100 35V10uF
UP-7740	C633-C634	3810502	2	TC04 ECSZ35HS6R8(242M3502-685M
UP-7740	C651	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-7740	DA601	0950544	1	D MA423 Cathode common
UP-7740	DA602	0950553	1	D MA424 Anode common
UP-7740	DA604	0950571	1	D MA430
UP-7740	D602-D603	0800172	2	D 1S2076A(1S953(3)1S954)
UP-7740	D604	1000383	1	ZD1 HZ3C3 500mW 3.3V
UP-7740	D607	1000383	1	ZD1 HZ3C3 500mW 3.3V
UP-7740	D616-D622	0800172	7	D 1S2076A(1S953(3)1S954)
UP-7740	IC601	1252752	1	OPIC HA17082PS 2FET
UP-7740	IC602	1300629	1	MIC HD14052BP(MC14052BCP)
UP-7740	IC603	1252752	1	OPIC HA17082PS 2FET
UP-7740	IC604	1253698	1	OPIC uPC 811C (LF 411CN)
UP-7740	IC605	1300629	1	MIC HD14052BP(MC14052BCP)
UP-7740	IC606	1253698	1	OPIC uPC 811C (LF 411CN)
UP-7740	IC607	1252752	1	OPIC HA17082PS 2FET
UP-7740	IC608	1301601	1	MIC HD14538BP (MC14538BCP)
UP-7740	L601	3751129	1	CH LH5-562
UP-7740	L602-L605	3780044	4	L LF5-471K
UP-7740	Q601	0301416	1	TRC 2SC372G-Y
UP-7740	Q603	0400488	1	TRD 2SD768K with SK16B YC40B
UP-7740	Q604	0200463	1	TRB 2SB727K with SK16B,YC40B
UP-7740	Q605	0400488	1	TRD 2SD768K with SK16B YC40B
UP-7740	Q606	0200463	1	TRB 2SB727K with SK16B,YC40B
UP-7740	Q607	0400488	1	TRD 2SD768K with SK16B YC40B
UP-7740	Q608	0200463	1	TRB 2SB727K with SK16B,YC40B
UP-7740	Q610	0100241	1	TRA 2SA673AK-C(2SA876H-B-C)
UP-7740	RA601	4090831	1	RM EXB-T44-102J
UP-7740	VR601	4160809	1	TPOT GF06P 2KOHM
UP-7740	VR602-VR606	4160667	5	TPOT GF06P 20KOHM
UP-7740	VR608	4160827	1	TPOT GF06P 500KOHM
UP-7740	VR609	4160854	1	TPOT RJ-6P 5MOHM
UP-7746	CNJ611	5427716	1	PCN M60-12-30-134

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

UP-7746 I/O CONNECTOR BD

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7746	CNJ640	5427716	1	PCN M60-12-30-134
UP-7746	CNP116	5427476	1	PCN M62-12-3039SA-1 (20)

UP-7850 RELAY BD

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7850	CNJ585	5424256	1	NCN 2-171825-4 Receptacle Male
UP-7850	CNP575	5416309	1	NCN 5195-2 HOUSING
UP-7850	CNP575	5416318	2	NCN 5194TL TERMINAL
UP-7850	CNP585	5415551	8	NCN Pin 170204-2
UP-7850	CNP585	5424265	2	NCN 2-171822-4 PLUG FEMALE
UP-7850	RLY502-RLY503	3400384	2	RY HV Relay NKR-102G 8KV 80mA

UP-7851 HIGH VOLTAGE BD

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7851		5491361	1	CHEM HEAT SINK SHEET TO-3P2 TC30AG(F-1)
UP-7851	CNJ501	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-7851	CNJ511	5414864	1	NCN 350543-1 4P
UP-7851	CNJ515	5424024	1	NCN 171825-2 Receptacle Male
UP-7851	CNJ525	5424033	1	NCN 171825-3 Receptacle Male
UP-7851	CNJ535	5427734	1	PCN 170267-1
UP-7851	CNJ545	5427734	1	PCN 170267-1
UP-7851	CNJ555	5427681	1	PCN M60-03-30-134
UP-7851	CNJ565	5424256	1	NCN 2-171825-4 Receptacle Male
UP-7851	CNJ575	5416327	1	NCN 5273-2A
UP-7851	C500	3851146	1	CEC2 DD05B471K500 500V470pF
UP-7851	C501	3800469	1	EC04 ECEA1HS010 50V1uF
UP-7851	C502	3839605	1	FLC1 ECQ-B1H472JZ 0.0047uF
UP-7851	C503	3801245	1	EC04 ECEA1VU 102
UP-7851	C504	3800193	1	EC04 ECEA1CS100 16V10uF
UP-7851	C505	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF
UP-7851	C506	3800237	1	EC04 ECEA1CS221 16V220uF
UP-7851	C507	3801414	1	EC04 ECES1EU682G 25V6800uF
UP-7851	C509	3800469	1	EC04 ECEA1HS010 50V1uF

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7851	C510	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF
UP-7851	C514	3859147	1	CEC2 10MDQ222M
UP-7851	C515	3839605	1	FLC1 ECQ-B1H472JZ 0.0047uF
UP-7851	C516	3839819	1	FLC1 ECQ-V1H334JZ 0.33uF
UP-7851	C517-C520	3839757	4	FLC1 ECQ-V1H104JZ 0.1uF
UP-7851	C721	3839641	1	FLC1 ECQ-B1H103JZ 0.01uF
UP-7851	C722-C723	3810502	2	TC04 ECSZ35HS6R8(242M3502-685M
UP-7851	C724	3839703	1	FLC1 ECQ-V1H333JZ 0.033uF
UP-7851	C725	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-7851	D500-D502	4322528	3	D 1S2076ARE
UP-7851	D503-D504	0910008	2	DP SR1FM8 800mA 400V
UP-7851	D506-D509	4322528	4	D 1S2076ARE
UP-7851	D510-D513	1101006	4	DP RC2 2007A 2KV
UP-7851	D515	0910008	1	DP SR1FM8 800mA 400V
UP-7851	D517	0910008	1	DP SR1FM8 800mA 400V
UP-7851	D518-D522	4322528	5	D 1S2076ARE
UP-7851	D720-D721	4322528	2	D 1S2076ARE
UP-7851	IC501	1253047	1	REG TL494CN SW REG
UP-7851	IC502	1300112	1	MIC MC14001UBCP (CD4001UBE)
UP-7851	IC503	1300638	1	MIC HD14053BP(MC14053BCP)
UP-7851	IC504	1253109	1	OPIC uPC358C DUAL
UP-7851	IC505	1253706	1	REG HA17806P Regulator
UP-7851	IC506	1252449	1	REG MC7906CT
UP-7851	IC720	1253715	1	OPIC uPC812C(LF412CN)2FET
UP-7851	L501-L502	3788009	2	L LF1-101K
UP-7851	Q500	0400568	1	TRD 2SD1271
UP-7851	Q501	0200499	1	TRB 2SB946
UP-7851	Q502	0400621	1	TRD 2SD1038
UP-7851	Q503	0400434	1	TRD 2SD571 L or M
UP-7851	Q504-Q506	0300596	3	TRC 2SC1345K-D(2SC1707H-C)
UP-7851	Q507	0200499	1	TRB 2SB946
UP-7851	RLY501	3430707	1	RY HV Relay NKR-102 8KV 80mA
UP-7851	T500	3790167	1	FBTF T-3790167 HV-DD
UP-7851	VR500	4160667	1	TPOT GF06P 20KOHM
UP-7851	VR501	4160658	1	TPOT GF06P 500 OHM
UP-7851	VR720	4160685	1	TPOT GF06P 100KOHM
UP-7851	VR721	4160613	1	TPOT GF06P 10KOHM

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

UP-76351 ECG/CPU BD

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-76351	CNJ100	5427663	1	PCN M60-12-30-114P STRAIGHT
UP-76351	CNJ101	5445474	1	PCN IL-2P-S3FP2-1
UP-76351	CNJ105	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-76351	CNJ106	5427173	1	PCN HIF3F-40PADSA 40P
UP-76351	CNJ108	5425139	1	PCN HKP-22MS-11BT
UP-76351	CNJ110	5427663	1	PCN M60-12-30-114P STRAIGHT
UP-76351	CNJ157	5427743	1	PCN HIF3F-34PA-2.54DSA
UP-76351	CNJ303	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-76351	CNJ355	5427636	1	PCN M60-03-30-114P STRAIGHT
UP-76351	C100	4317525	1	CEC1 TP D55Y5V1H 104Z 5-W
UP-76351	C103-C109	4317525	7	CEC1 TP D55Y5V1H 104Z 5-W
UP-76351	C111	4317525	1	CEC1 TP D55Y5V1H 104Z 5-W
UP-76351	C112	3820768	1	FLC1 454M6302 104K
UP-76351	C113	4317525	1	CEC1 TP D55Y5V1H 104Z 5-W
UP-76351	C120	3800469	1	EC04 ECEA1HS010 50V1uF
UP-76351	C121	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-76351	C122	4315304	1	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-76351	C123	3800469	1	EC04 ECEA1HS010 50V1uF
UP-76351	C124	4315082	1	FLC1 ECQ-B 1H 222JZ3 0.0022uF
UP-76351	C125-C126	3839793	2	FLC1 ECQ-V1H224JZ 0.22uF
UP-76351	C127	3800469	1	EC04 ECEA1HS010 50V1uF
UP-76351	C128	4315206	1	FLC1 ECQ-B 1H 223JZ3 0.022uF
UP-76351	C129	4317623	1	CEC2 DD05-989B 331K500 (330pF)
UP-76351	C130	4317614	1	CEC2 DD05-989B 221K500 (220pF)
UP-76351	C151	3851066	1	CEC2 DD05SL220K500 500V22pF
UP-76351	C152	3890353	1	ECR-GA035M11-35pF
UP-76351	C153	3839837	1	FLC1 ECQ-V1H474JZ 0.47uF
UP-76351	C201-C206	4315304	6	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-76351	C207-C210	4315162	4	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-76351	C211-C220	4315304	10	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-76351	C230	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-76351	C231	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-76351	C232	3800371	1	EC04 ECEA1VS100 35V10uF
UP-76351	C233	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-76351	C234	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-76351	C241-C242	4315046	2	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-76351	C243	3800371	1	EC04 ECEA1VS100 35V10uF
UP-76351	C250-C251	3839873	2	FLC1 ECQ-V1H105JZ 1.0uF
UP-76351	C252	4315269	1	FLC1 ECQ-V 1H 473JZ3 (0.047uF)
UP-76351	C253	4317641	1	CEC2 DD06-999B 681K500 (680pF)

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-76351	C254	3824461	1	MPC ECQ-V1H 154JZ 50V 0.15uF
UP-76351	C255	4315304	1	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-76351	C256	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-76351	C257-C270	4315304	14	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-76351	C271-C272	3800219	2	EC04 ECEA1CS470 16V47uF
UP-76351	C273	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-76351	C274	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF
UP-76351	C275	4315269	1	FLC1 ECQ-V 1H 473JZ3 (0.047uF)
UP-76351	C301-C304	4315046	4	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-76351	C305	3839819	1	FLC1 ECQ-V1H334JZ 0.33uF
UP-76351	C306	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-76351	C307	3800371	1	EC04 ECEA1VS100 35V10uF
UP-76351	C309-C310	3800371	2	EC04 ECEA1VS100 35V10uF
UP-76351	C311	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-76351	C312	4315287	1	FLC1 ECQ-V 1H 683JZ3 (0.068uF)
UP-76351	C351-C352	4315162	2	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-76351	C353	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-76351	C354	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-76351	C355-C356	3800371	2	EC04 ECEA1VS100 35V10uF
UP-76351	C401	4317614	1	CEC2 DD05-989B 221K500 (220pF)
UP-76351	C402-C407	4317525	6	CEC1 TP D55Y5V1H 104Z 5-W
UP-76351	DA101	0950571	1	D MA430
UP-76351	DA102	0800582	1	D Diode Array DAN 401
UP-76351	DA103	0800573	1	D Diode Array DAP 401
UP-76351	DA104	0800582	1	D Diode Array DAN 401
UP-76351	DA105	0800573	1	D Diode Array DAP 401
UP-76351	DA231	0800573	1	D Diode Array DAP 401
UP-76351	DA232	0800582	1	D Diode Array DAN 401
UP-76351	DA233	0800573	1	D Diode Array DAP 401
UP-76351	D100-D106	4322528	7	D 1S2076ARE
UP-76351	D151-D153	4322528	3	D 1S2076ARE
UP-76351	D201-D216	0800564	16	D 1SS237
UP-76351	D217-D218	4322528	2	D 1S2076ARE
UP-76351	D219	0800564	1	D 1SS237
UP-76351	D220-D225	4322528	6	D 1S2076ARE
UP-76351	D230-D231	4322528	2	D 1S2076ARE
UP-76351	D232	0800092	1	D 0A91(1S1005)
UP-76351	D241-D242	4322528	2	D 1S2076ARE
UP-76351	D253-D259	4322528	7	D 1S2076ARE
UP-76351	D301-D302	4322528	2	D 1S2076ARE
UP-76351	D303-D304	4327612	2	ZD2 HZ9C1RE (8.9-9.3V)
UP-76351	D305-D314	0800644	10	D 1SV126
UP-76351	D351-D354	4322528	4	D 1S2076ARE

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION	
UP-76351	D355-D356	4327612	2	ZD2	HZ9C1RE (8.9-9.3V)
UP-76351	D357-D358	4322528	2	D	1S2076ARE
UP-76351	D401	4322528	1	D	1S2076ARE
UP-76351	GA351	2100335	1	GA	B1C90 (90V)
UP-76351	ICS103	5422846	1	SOKT	IC SOCKET DL-2-28A (01)
UP-76351	ICS107	5601279	1	SOKT	208-93-764 64PIC SOCKET
UP-76351	ICS201	5601279	1	SOKT	208-93-764 64PIC SOCKET
UP-76351	ICS203	5422846	1	SOKT	IC SOCKET DL-2-28A (01)
UP-76351	ICS405	5601279	1	SOKT	208-93-764 64PIC SOCKET
UP-76351	IC101	1205786	1	CPU	uPD71055C(82C55A-2)
UP-76351	IC102	1302859	1	CPU	uPD8279C-2
UP-76351	IC104	1302984	1	MIC	uPD74HC138C(HD74HC138P)
UP-76351	IC105	1253403	1	AIC	TL7700C
UP-76351	IC106	1303528	1	MIC	uPD74HC123C(HD74HC123P)
UP-76351	IC107	1205768	1	CPU	HD63B03XP
UP-76351	IC108	1303074	1	MIC	uPD74HC4040C(HD74HC4040P
UP-76351	IC109	1302948	1	MIC	uPD74HC08C(HD74HC08P)
UP-76351	IC110	1302975	1	MIC	HD74HC32P(uPD74HC32C)
UP-76351	IC112	1203752	1	TIC	SN74LS365
UP-76351	IC114	1252752	1	OPIC	HA17082PS 2FET
UP-76351	IC115	1302948	1	MIC	uPD74HC08C(HD74HC08P)
UP-76351	IC116	1302912	1	MIC	HD74HC00P(uPD74HC00C)
UP-76351	IC151	1303662	1	CPU	MSM6242 RS
UP-76351	IC201	1205768	1	CPU	HD63B03XP
UP-76351	IC202	1253501	1	ADIC	uPD-7004C8CH10BITA/D
UP-76351	IC204	1206473	1	CPU	MB84256-10LP-G
UP-76351	IC205	1303065	1	MIC	HD74HC245P(uPD74HC245C)
UP-76351	IC206-IC207	1303056	2	MIC	HD74HC244P(uPD74HC244C)
UP-76351	IC208	1302912	1	MIC	HD74HC00P(uPD74HC00C)
UP-76351	IC209	1302939	1	MIC	HD74HC04P(uPD74HC04C)
UP-76351	IC230	1300629	1	MIC	HD14052BP(MC14052BCP)
UP-76351	IC250	1300629	1	MIC	HD14052BP(MC14052BCP)
UP-76351	IC251	1601875	1	MD	NP2014B
UP-76351	IC252	1300611	1	MIC	HD14051BP(MC14051BCP)
UP-76351	IC253	1300638	1	MIC	HD14053BP(MC14053BCP)
UP-76351	IC254-IC255	1253118	2	OPIC	uPC324C QUAD
UP-76351	IC256	1253715	1	OPIC	uPC812C(LF412CN)2FET
UP-76351	IC257	1300638	1	MIC	HD14053BP(MC14053BCP)
UP-76351	IC258	1252084	1	OPIC	TL072CP
UP-76351	IC301-IC302	1252084	2	OPIC	TL072CP
UP-76351	IC303-IC305	1300611	3	MIC	HD14051BP(MC14051BCP)
UP-76351	IC306	1253724	1	OPIC	uPC4570C
UP-76351	IC307	1251165	1	OPIC	uPC1458C

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION	
UP-76351	IC308	1251904	1	AIC	MB4204 (uPC339C)
UP-76351	IC309	1300629	1	MIC	HD14052BP(MC14052BCP)
UP-76351	IC351	1252084	1	OPIC	TL072CP
UP-76351	IC352	1300629	1	MIC	HD14052BP(MC14052BCP)
UP-76351	IC401-IC402	1303056	2	MIC	HD74HC244P(uPD74HC244C)
UP-76351	IC403	1303065	1	MIC	HD74HC245P(uPD74HC245C)
UP-76351	IC404	1204902	1	CPU	HM6264LP-15(uPD4364C-15L
UP-76351	IC406	1251174	1	ADIC	uPC624C (DAC-08CQ)
UP-76351	IC408	1300522	1	MIC	HD14042BP (MC14042BCP)
UP-76351	IC409	1303546	1	MIC	HD74HC151P (uPD74HC151C)
UP-76351	IC410	1303074	1	MIC	uPD74HC4040C(HD74HC4040P
UP-76351	IC411	1302921	1	MIC	uPD74HC02C(HD74HC02P)
UP-76351	IC412	1303412	1	MIC	SN74HC03N(uPD74HC03C)
UP-76351	PC301	0600254	1	TRP	PC837
UP-76351	PC302	1704345	1	TRP	PC817 PHOTOCOUPLER
UP-76351	Q230-Q231	4335069	2	TRC	2SC1213AKDTZ
UP-76351	Q240-Q241	4335069	2	TRC	2SC1213AKDTZ
UP-76351	Q250	4330038	1	TRA	2SA495GTM-Y,TPE2
UP-76351	Q251	4335069	1	TRC	2SC1213AKDTZ
UP-76351	RA100	4090582	1	RM	EXB-P84-103J
UP-76351	RA101	4090813	1	RM	EXB-P88-103J
UP-76351	RA102-RA103	4090582	2	RM	EXB-P84-103J
UP-76351	RA104	4090813	1	RM	EXB-P88-103J
UP-76351	RA105-RA106	4091153	2	RM	EXB-T44-101J
UP-76351	RA201-RA202	4092624	2	RM	EXB-T44-472J 4.7 KOHM
UP-76351	RA203	4090822	1	RM	EXB-P88-472J
UP-76351	RA204	4090787	1	RM	EXB-P88-104J
UP-76351	RA206	4090813	1	RM	EXB-P88-103J
UP-76351	RA230	4091884	1	RM	EXB-P84-472J
UP-76351	RA301	4093338	1	RM	CMR-042B 20.0K OHM
UP-76351	RA302	4093347	1	RM	CMR-042A 30.1K OHM
UP-76351	RA303	4090689	1	RM	EXB-P84-473J
UP-76351	RA304	4093356	1	RM	EXB-F8V-154J
UP-76351	RA305-RA306	4091572	2	RM	EXB-T44-103J
UP-76351	RA401	4090813	1	RM	EXB-P88-103J
UP-76351	SW100	3352168	1	SW	DSS 104
UP-76351	SW102	3350838	1	DSW	DSS102
UP-76351	T301	3772285	1	PLTF	EP17 50KHZ SIG Yellow
UP-76351	T302	3772267	1	PLTF	EP17 50KHZ DC-DC Red
UP-76351	T351	3772258	1	PLTF	EP13 50KHZ SIG Yellow
UP-76351	T352	3772276	1	PLTF	EP13 50KHZ DC-DC Red
UP-76351	VR101	4160685	1	TPOT	GF06P 100KOHM
UP-76351	VR251	4160596	1	TPOT	GF06P 1KOHM

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-76351	VR252	4160667	1	TPOT GF06P 20KOHM
UP-76351	VR253	4160827	1	TPOT GF06P 500KOHM
UP-76351	VR254	4160667	1	TPOT GF06P 20KOHM
UP-76351	VR255	4160604	1	TPOT GF06P 5KOHM
UP-76351	X100	1750927	1	XTAL TD308C(XCO-B)8MHZ
UP-76351	X151	1702597	1	XTAL KF38G 32.768KHZ
UP-76351	ZD250	1253519	1	REG LT1009CZ 2.5VREF
UP-76351	ZD251	1090329	1	ZD2 HZ6C1 6V

UP-76391 VR AND CONNECTOR BD

UP-76391		5350531	1	CCN2 HR16-17RA-6S 6P FEMALE
UP-76391	CNP303	5427966	1	PCN CABLE TEC ECG M62-15

UP-76392 VR AND CONNECTOR BD

UP-76392		5395108	1	CCN2 XZ-123R (8S)
UP-76392	CNP303	5427966	1	PCN CABLE TEC ECG M62-15

UP-76393 VR AND CONNECTOR BD

UP-76393		5395108	1	CCN2 XZ-123R (8S)
UP-76393	CNP303	5427966	1	PCN CABLE TEC ECG M62-15

UP-76396 VR AND CONNECTOR BD

UP-76396		5395108	1	CCN2 XZ-123R (8S)
UP-76396	CNP303	5427966	1	PCN CABLE TEC ECG M62-15

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

UP-76397 VR AND CONNECTOR BD

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-76397		5395108	1	CCN2 XZ-123R (8S)
UP-76397	CNP303	5427966	1	PCN CABLE TEC ECG M62-15

UP-76398 VR AND CONNECTOR BD

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-76398		5395108	1	CCN2 XZ-123R (8S)
UP-76398	CNP303	5427966	1	PCN CABLE TEC ECG M62-15

WS-701X RECORDER CHASSIS PARTS

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
WS-701X		0600236	1	TRP NJL5142EL-A
WS-701X		1800063	1	HEAD EUX-C18A8HC01
WS-701X		3280111	2	SW SS-5GL2
WS-701X		4700593	1	SP EFB-VH36A Piezo speaker
WS-701X		4790673	1	TD MAGNETIC SENSOR FP-2R-02
WS-701X		4810447	1	DCMO EN35-H107N1B (24V)
WS-701X		5424024	1	NCN 171825-2 Receptacle Male
WS-701X	CNP700	5427511	1	PCN M62-15-3034SA (30)
WS-701X	CNP710	5552697	1	PCN HKP20FS02-10BT(15)

WS-702X RECORDER CHASSIS PARTS

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
WS-702X		0600236	1	TRP NJL5142EL-A
WS-702X		1800063	1	HEAD EUX-C18A8HC01
WS-702X		3280111	2	SW SS-5GL2
WS-702X		4700593	1	SP EFB-VH36A Piezo speaker
WS-702X		4810447	1	DCMO EN35-H107N1B (24V)
WS-702X		5424024	1	NCN 171825-2 Receptacle Male
WS-702X	CNP617	5427306	1	PCN M62-03-3036SA (10)
WS-702X	CNP700	5427511	1	PCN M62-15-3034SA (30)

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
WS-702X	CNP710	5552697	1	PCN HKP20FS02-10BT(15)
WS-702X		4740986	1	TD ROTARY ENCODER 200P/R

YZ-000G8 CHASSIS PARTS-2

YZ-000G8		3853331	1	C HV Capacitor IA5040AD
YZ-000G8		4840343	1	FAMO MD516B-12-Q2

YZ-001G0 CHASSIS PARTS-2

YZ-001G0		4840343	1	FAMO MD516B-12-Q2
YZ-001G0	C550	3853429	1	C HV Capacitor NKC5040A

YZ-001G1 CHASSIS PARTS-2

YZ-001G1		3853429	1	C HV Capacitor NKC5040A
YZ-001G1		4840343	1	FAMO MD516B-12-Q2

YZ-001G2 CHASSIS PARTS-2

YZ-001G2	C550	3853429	1	C HV Capacitor NKC5040A

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

YZ-001G3 CHASSIS PARTS-2

YZ-001G3		4840343	1	FAMO MD516B-12-Q2
YZ-001G3	C550	3853429	1	C HV Capacitor NKC5040A

YZ-001G4 CHASSIS PARTS-2

YZ-001G4		3853331	1	C HV Capacitor IA5040AD
YZ-001G4		4840343	1	FAMO MD516B-12-Q2

YZ-001G5 CHASSIS PARTS-2

YZ-001G5		3853429	1	C HV Capacitor NKC5040A
YZ-001G5		4840343	1	FAMO MD516B-12-Q2

YZ-001G6 CHASSIS PARTS-2

YZ-001G6		4840343	1	FAMO MD516B-12-Q2
YZ-001G6	C550	3853429	1	C HV Capacitor NKC5040A

YZ-001G8 CHASSIS PARTS-2

YZ-001G8		4840343	1	FAMO MD516B-12-Q2
YZ-001G8	C550	3853429	1	C HV Capacitor NKC5040A

YZ-002G1 CHASSIS PARTS-2

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
YZ-002G1		3853331	1	C HV Capacitor IA5040AD
YZ-002G1		4840343	1	FAMO MD516B-12-Q2
YZ-002G1		5501084	1	CORD V1.25-4 (250) Black
YZ-002G1	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-002G1	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-002G1	CNP552	5500851	1	CORD HV Cable 201328-1(210) White

YZ-002G3 CHASSIS PARTS-2

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
YZ-002G3		4840343	1	FAMO MD516B-12-Q2
YZ-002G3	C550	3853429	1	C HV Capacitor NKC5040A
YZ-002G3		5501084	1	CORD V1.25-4 (250) Black
YZ-002G3	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-002G3	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-002G3	CNP552	5500851	1	CORD HV Cable 201328-1(210) White

YZ-002G4 CHASSIS PARTS-2

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
YZ-002G4		5501084	1	CORD V1.25-4 (250) Black
YZ-002G4	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-002G4	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-002G4	CNP552	5500851	1	CORD HV Cable 201328-1(210) White

YZ-002G5 CHASSIS PARTS-2

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
YZ-002G5	C550	3853429	1	C HV Capacitor NKC5040A
YZ-002G5		5501084	1	CORD V1.25-4 (250) Black
YZ-002G5	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-002G5	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-002G5	CNP552	5500851	1	CORD HV Cable 201328-1(210) White

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

YZ-002G6 CHASSIS PARTS-2

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
YZ-002G6		4840343	1	FAMO MD516B-12-Q2
YZ-002G6	C550	3853429	1	C HV Capacitor NKC5040A
YZ-002G6		5501084	1	CORD V1.25-4 (250) Black
YZ-002G6	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-002G6	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-002G6	CNP552	5500851	1	CORD HV Cable 201328-1(210) White

YZ-002G7 CHASSIS PARTS-2

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
YZ-002G7		3853331	1	C HV Capacitor IA5040AD
YZ-002G7		4840343	1	FAMO MD516B-12-Q2
YZ-002G7		5501084	1	CORD V1.25-4 (250) Black
YZ-002G7	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-002G7	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-002G7	CNP552	5500851	1	CORD HV Cable 201328-1(210) White

YZ-002G8 CHASSIS PARTS-2

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
YZ-002G8		4840343	1	FAMO MD516B-12-Q2
YZ-002G8	C550	3853429	1	C HV Capacitor NKC5040A
YZ-002G8		5501084	1	CORD V1.25-4 (250) Black
YZ-002G8	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-002G8	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-002G8	CNP552	5500851	1	CORD HV Cable 201328-1(210) White

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

YZ-002G9 CHASSIS PARTS-2

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
YZ-002G9		3853429	1	C HV Capacitor NKC5040A
YZ-002G9		4840343	1	FAMO MD516B-12-Q2
YZ-002G9		5501084	1	CORD V1.25-4 (250) Black
YZ-002G9	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-002G9	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-002G9	CNP552	5500851	1	CORD HV Cable 201328-1(210) White

YZ-003G1 CHASSIS PARTS-2

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
YZ-003G1		4840343	1	FAMO MD516B-12-Q2
YZ-003G1	C550	3853429	1	C HV Capacitor NKC5040A
YZ-003G1		5501084	1	CORD V1.25-4 (250) Black
YZ-003G1	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-003G1	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-003G1	CNP552	5500851	1	CORD HV Cable 201328-1(210) White

YZ-003G4 CHASSIS PARTS-2

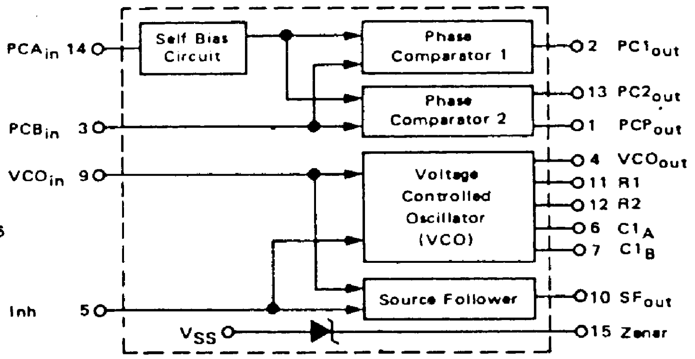
ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
YZ-003G4		3853429	1	C HV Capacitor NKC5040A
YZ-003G4		4840343	1	FAMO MD516B-12-Q2
YZ-003G4		5501084	1	CORD V1.25-4 (250) Black
YZ-003G4	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-003G4	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-003G4	CNP552	5500851	1	CORD HV cable 201328-1(210) White

Section 9 IC DATA

CD4046BE 9.1
CD4051BE 9.1
CD4052BE 9.1
CD4053BE 9.1
HA17082PS 9.2
HA17723 .... 9.2
HA17741PS 9.2
HA178M05 .... 9.2
HA17806P 9.2
HA17812P 9.2
HD14042BP 9.2
HD14538BP 9.3
HD63B03XP 9.3
HD637B01X0 .... 9.15
HD74HC00P 9.4
HD74HC04P 9.4
HD74HC151P 9.4
HD74HC244P 9.4
HD74HC245P 9.5
HD74HC32P 9.5
HM6264LP-15 .... 9.5
MB4204 .... 9.6
MC14001BCP 9.6
MC14001UBCP 9.6
MC14011BCP 9.6
MC78L05CP 9.6
MC7906CT 9.6
MSM6242RS 9.6
NJL5142EL-A 9.7
NP2014B 9.7
PC827 .... 9.7
PC817 .... 9.7
PC837 .... 9.7
SN74HC03N 9.7
SN74LS07 .... 9.7
SN74LS365 .... 9.8
SWC-01 .... 9.8
TL072CP 9.9
TL494CN 9.9
TL7700C 9.9
µPA2004C-10 .... 9.9
µPC1458C 9.10
µPC324C 9.10
µPC358C 9.10
µPC393C 9.10
µPC4570C 9.10
µPC624C 9.10
µPC811C 9.11
µPC812C 9.11
µPD7004C 9.11
µPD71055C 9.12
µPD74HC08C 9.12
µPD74HC123C 9.12
µPD74HC138C 9.13
µPD74HC4040 .... 9.13
µPD8279C-2 .... 9.14

CD4046BE

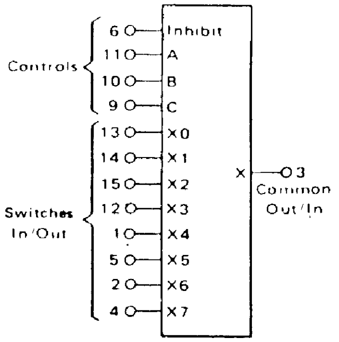
Phase-Locked Loop


PCA_in 14
PCB_in 3
VCO_in 9
Inh 5
Self Bias Circuit
Phase Comparator 1
Phase Comparator 2
Voltage Controlled Oscillator (VCO)
Source Follower
V_SS
2 PC1_out
13 PC2_out
1 PCP_out
4 VCO_out
11 R1
12 R2
6 C1_A
7 C1_B
10 SF_out
15 Zener

V_{DD} = Pin 16
V_{SS} = Pin 8

CD4051BE

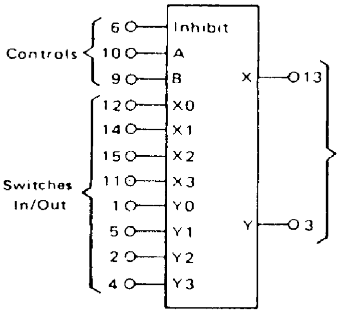
8-Channel Analog
Multiplexer / Demultiplexer


Controls
6
11
10
9
Inhibit
A
B
C
Switches In/Out
13
14
15
12
1
5
2
4
X0
X1
X2
X3
X4
X5
X6
X7
X
3
Common Out/In

V_{DD} = Pin 16
V_{SS} = Pin 8
V_{EE} = Pin 7

CD4052BE

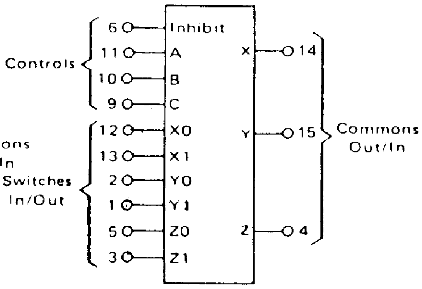
4-Channel Analog
Multiplexer / Demultiplexer


Controls
6
10
9
Inhibit
A
B
Switches In/Out
12
14
15
11
1
5
2
4
X0
X1
X2
X3
Y0
Y1
Y2
Y3
X
13
Y
3
Commons Out/In

V_{DD} = Pin 16
V_{SS} = Pin 8
V_{EE} = Pin 7

CD4053BE

2-Channel Analog
Multiplexer / Demultiplexer


Controls
6
11
10
9
Inhibit
A
B
C
Switches In/Out
12
13
2
1
5
3
X0
X1
Y0
Y1
Z0
Z1
X
14
Y
15
Z
4
Commons Out/In

V_{DD} = Pin 16
V_{SS} = Pin 8
V_{EE} = Pin 7

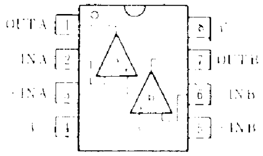
Note: Control Inputs referenced to V_{SS}. Analog Inputs and Outputs reference to V_{EE}. V_{EE} must be $\leq V_{SS}$.

TRUTH TABLE

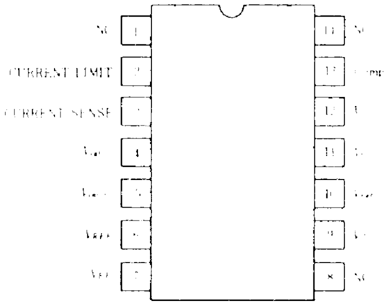
Control Inputs				ON Switches					
	Select								
Inhibit	C*	B	A	MC14051B	MC14052B		MC14053B		
0	0	0	0	X0	Y0	X0	Z0	Y0	X0
0	0	0	1	X1	Y1	X1	Z0	Y0	X1
0	0	1	0	X2	Y2	X2	Z0	Y1	X0
0	0	1	1	X3	Y3	X3	Z0	Y1	X1
0	1	0	0	X4			Z1	Y0	X0
0	1	0	1	X5			Z1	Y0	X1
0	1	1	0	X6			Z1	Y1	X0
0	1	1	1	X7			Z1	Y1	X1
1	x	x	x	None	None		None		

*Not applicable for MC14052
x = Don't Care

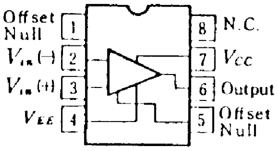
HA17082PS
OP-Amp


OUT A
1
IN A
2
+IN A
3
4
8
OUT B
7
IN B
6
+IN B
5

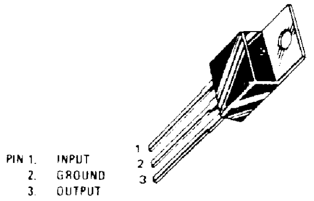
HA17723
Voltage Regulator


NC
1
CURRENT LIMIT
2
CURRENT SENSE
3
4
5
6
7
14
NC
13
12
11
10
9
8
NC

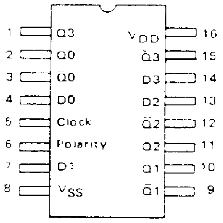
HA17741PS
OP-AMP


Offset Null
1
V_{in} (−)
2
V_{in} (+)
3
V_{EE}
4
8
N.C.
7
V_{CC}
6
Output
5
Offset Null

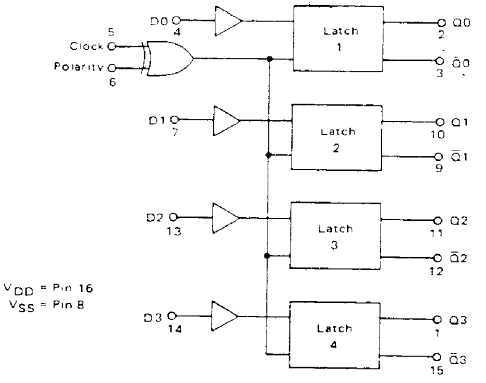
HA178M05
HA17806P
HA17812P
Voltage Regulator


PIN 1. INPUT
2. GROUND
3. OUTPUT
1
2
3

HD14042BP
Latch


1
Q3
2
Q0
3
$\bar{Q}0$
4
D0
5
Clock
6
Polarity
7
D1
8
V_{SS}
V_{DD}
16
$\bar{Q}3$
15
D3
14
D2
13
$\bar{Q}2$
12
Q2
11
Q1
10
$\bar{Q}1$
9

LOGIC DIAGRAM

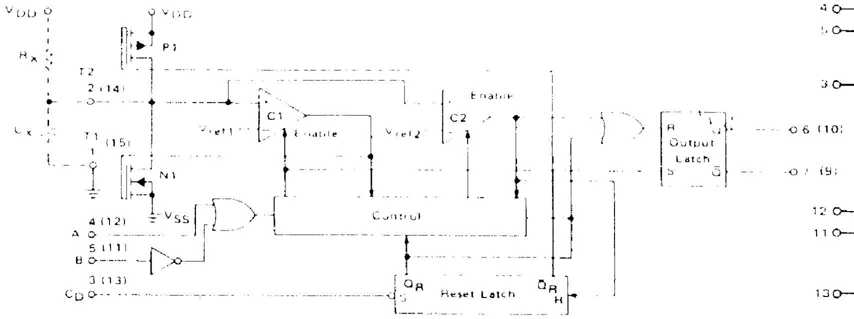

D0
4
Clock
5
Polarity
6
Latch 1
Q0
2
$\bar{Q}0$
3
D1
7
Latch 2
Q1
10
$\bar{Q}1$
9
D2
13
Latch 3
Q2
11
$\bar{Q}2$
12
D3
14
Latch 4
Q3
1
$\bar{Q}3$
15
V_{DD} = Pin 16
V_{SS} = Pin 8

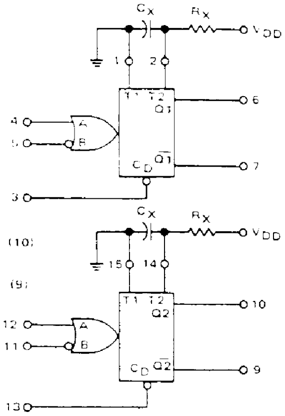
TRUTH TABLE

CLOCK	POLARITY	Q
0	0	Data
↑	0	Latch
1	1	Data
↓	1	Latch

HD14538BP

Monostable Multivibrator


VDD
VDD
P1
Rx
T2
2 (14)
Cx
T1 (15)
1
N1
VSS
C1
Vref1
Enable
Vref2
C2
Enable
Control
4 (12)
A
5 (11)
B
3 (13)
CD
QR
Reset Latch
QR
R
S
Output Latch
Q
Q̄
6 (10)
7 (9)

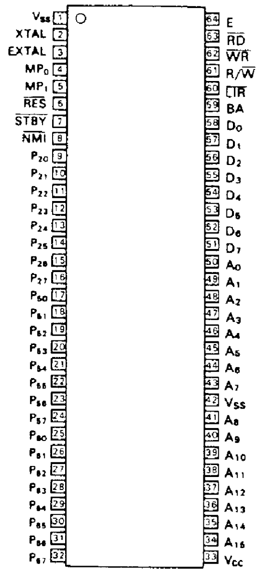

Cx
Rx
VDD
1
2
T1 T2
Q1
6
4
5
A
B
CD
Q̄1
7
3
Cx
Rx
VDD
15
14
T1 T2
Q2
10
12
11
A
B
CD
Q̄2
9
13

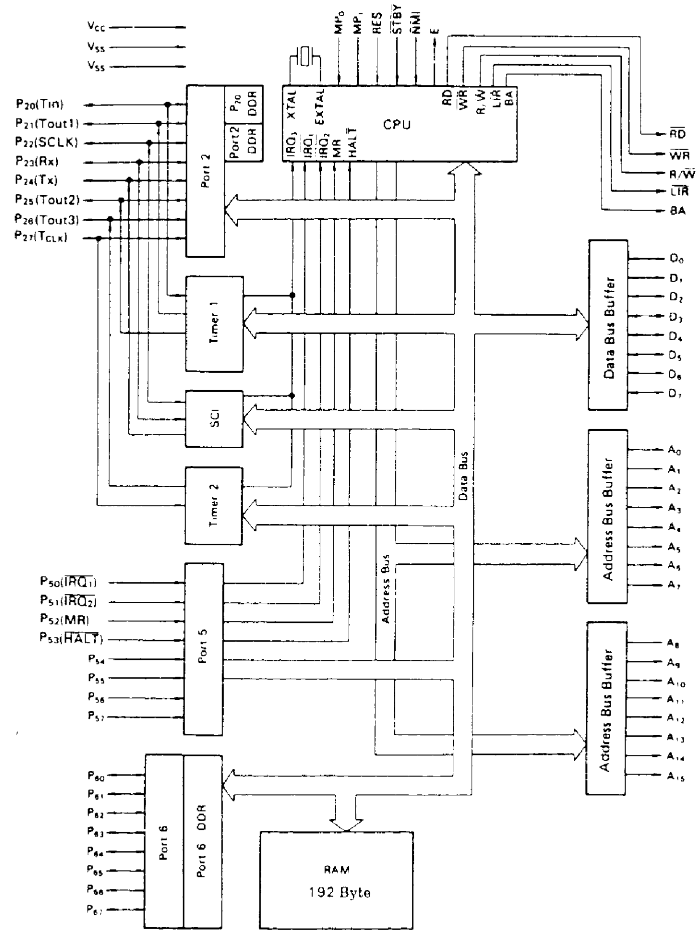
Rx and Cx are external components.

VDD = Pin 16
VSS = Pin 8, Pin 1, Pin 15

HD63B03XP

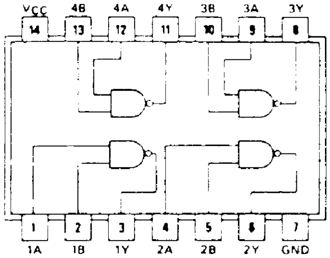
CPU


Vss 1
XTAL 2
EXTAL 3
MP0 4
MP1 5
RES 6
STBY 7
NMI 8
P20 9
P21 10
P22 11
P23 12
P24 13
P25 14
P26 15
P27 16
P60 17
P61 18
P62 19
P63 20
P64 21
P65 22
P66 23
P67 24
P80 25
P81 26
P82 27
P83 28
P84 29
P85 30
P86 31
P87 32
64 E
63 RD
62 WR
61 R/W
60 LIR
59 BA
58 D0
57 D1
56 D2
55 D3
54 D4
53 D5
52 D6
51 D7
50 A0
49 A1
48 A2
47 A3
46 A4
45 A5
44 A6
43 A7
42 Vss
41 A8
40 A9
39 A10
38 A11
37 A12
36 A13
35 A14
34 A15
33 Vcc


Vcc
Vss
Vss
MP0
MP1
RES
STBY
NMI
E
XTAL
EXTAL
IRQ3
IRQ1
IRQ2
MR
HALT
CPU
RD
WR
R/W
LIR
BA
P20(Tin)
P21(Tout1)
P22(SCLK)
P23(Rx)
P24(Tx)
P25(Tout2)
P26(Tout3)
P27(TCLK)
Port 2
P2 DDR
Port2 DDH
Timer 1
SCI
Timer 2
Data Bus
Address Bus
RD
WR
R/W
LIR
BA
Data Bus Buffer
D0
D1
D2
D3
D4
D5
D6
D7
Address Bus Buffer
A0
A1
A2
A3
A4
A5
A6
A7
Address Bus Buffer
A8
A9
A10
A11
A12
A13
A14
A15
P50(IRQ1)
P51(IRQ2)
P52(MR)
P53(HALT)
P54
P55
P56
P57
Port 5
P60
P61
P62
P63
P64
P65
P66
P67
Port 6
Port 6 DDR
RAM
192 Byte

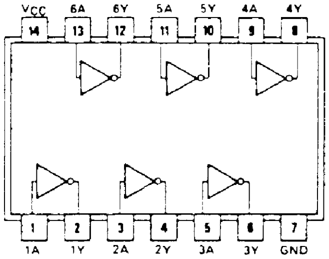
HD74HC00P

2-Input NAND Gates


VCC
4B
4A
4Y
3B
3A
3Y
14
13
12
11
10
9
8
1
2
3
4
5
6
7
1A
1B
1Y
2A
2B
2Y
GND

HD74HC04P

Inverters


VCC
6A
6Y
5A
5Y
4A
4Y
14
13
12
11
10
9
8
1
2
3
4
5
6
7
1A
1Y
2A
2Y
3A
3Y
GND

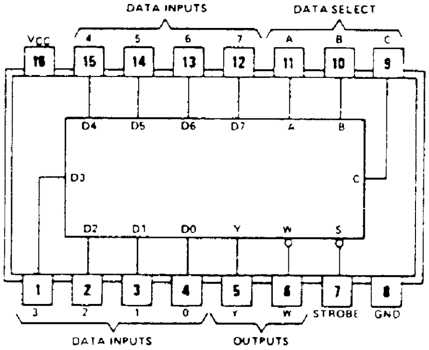
HD74HC151P

Multiplexers

FUNCTION TABLE

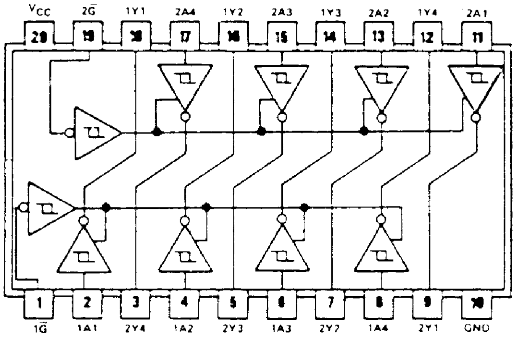
INPUTS				OUTPUTS	
SELECT			STROBE	Y	W
C	B	A	S		
X	X	X	H	L	H
L	L	L	L	D0	$\overline{D0}$
L	L	H	L	D1	$\overline{D1}$
L	H	L	L	D2	$\overline{D2}$
L	H	H	L	D3	$\overline{D3}$
H	L	L	L	D4	$\overline{D4}$
H	L	H	L	D5	$\overline{D5}$
H	H	L	L	D6	$\overline{D6}$
H	H	H	L	D7	$\overline{D7}$

H = high level, L = low level, X = irrelevant


DATA INPUTS
DATA SELECT
4
5
6
7
A
B
C
VCC
16
15
14
13
12
11
10
9
D4
D5
D6
D7
A
B
D3
C
D2
D1
D0
Y
W
S
1
2
3
4
5
6
7
8
3
2
1
0
Y
W
STROBE
GND
DATA INPUTS
OUTPUTS

HD74HC244P

Buffers / Line Drivers / Line Receivers


VCC
2G̅
1Y1
2A4
1Y2
2A3
1Y3
2A2
1Y4
2A1
20
19
18
17
16
15
14
13
12
11
1
2
3
4
5
6
7
8
9
10
1G̅
1A1
2Y4
1A2
2Y3
1A3
2Y2
1A4
2Y1
GND

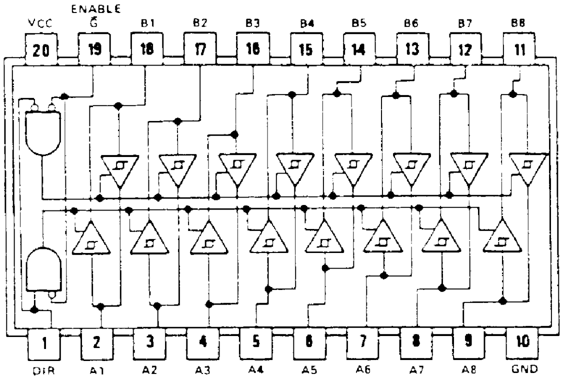
HD74HC245P

Bus Tranceivers

FUNCTION TABLE

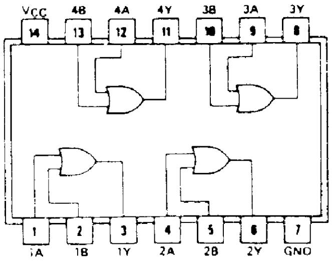
ENABLE $\overline{G}$	DIRECTION CONTROL DIR	OPERATION
L	L	B data to A bus
L	H	A data to B bus
H	X	isolation

H = high level, L = low level, X = irrelevant


VCC
ENABLE $\overline{G}$
B1
B2
B3
B4
B5
B6
B7
B8
20
19
18
17
16
15
14
13
12
11
1
2
3
4
5
6
7
8
9
10
DIR
A1
A2
A3
A4
A5
A6
A7
A8
GND

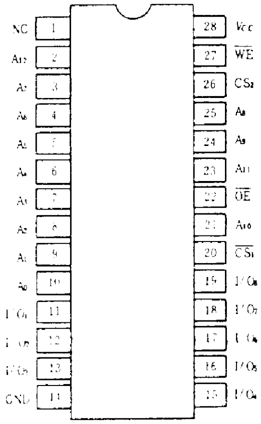
HD74HC32P

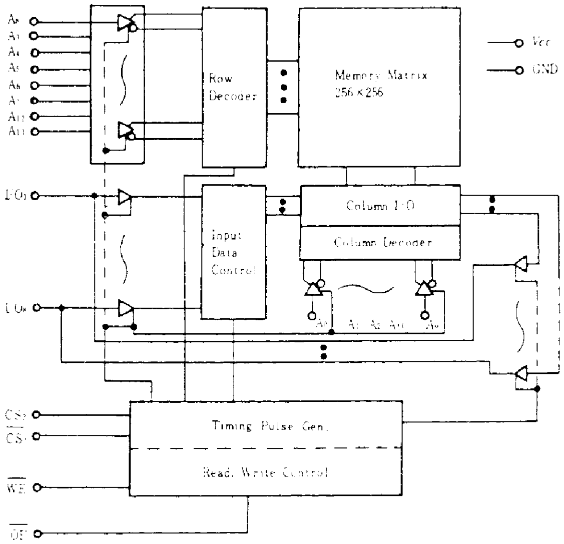
2-Input OR Gates


VCC
4B
4A
4Y
3B
3A
3Y
14
13
12
11
10
9
8
1
2
3
4
5
6
7
1A
1B
1Y
2A
2B
2Y
GND

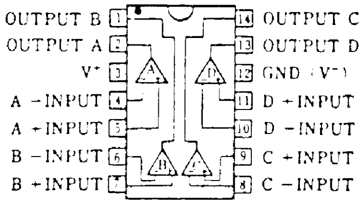
HM6264LP-15

8192-word × 8-Bit RAM

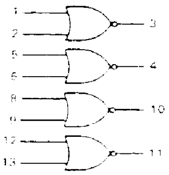

NC
A12
A7
A6
A5
A4
A3
A2
A1
A0
I/O1
I/O2
I/O3
GND
1
2
3
4
5
6
7
8
9
10
11
12
13
14
28
27
26
25
24
23
22
21
20
19
18
17
16
15
Vcc
$\overline{WE}$
CS2
A8
A9
A11
$\overline{OE}$
A10
$\overline{CS1}$
I/O8
I/O7
I/O6
I/O5
I/O4


A8
A3
A4
A5
A6
A7
A12
A11
Row Decoder
Memory Matrix 256 × 256
Vcc
GND
I/O1
I/O8
Input Data Control
Column I/O
Column Decoder
A0
A1
A2
A10
A9
CS2
$\overline{CS1}$
$\overline{WE}$
$\overline{OE}$
Timing Pulse Gen.
Read, Write Control

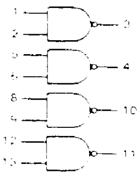
MB4204
Comparator


OUTPUT B 1
OUTPUT A 2
V+ 3
A −INPUT 4
A +INPUT 5
B −INPUT 6
B +INPUT 7
8 C −INPUT
9 C +INPUT
10 D −INPUT
11 D +INPUT
12 GND (V−)
13 OUTPUT D
14 OUTPUT C
A
B
C
D

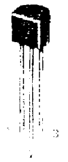
MC14001BCP
MC14001UBCP
2-Input NOR Gate


1
2
3
5
6
4
8
9
10
12
13
11

MC14011BCP
2-Input NAND Gate

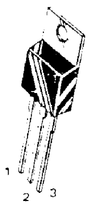

1
2
3
5
6
4
8
9
10
12
13
11

MC78L05CP
Voltage Regulator



Pin 1 Output
2. Ground
3 Input

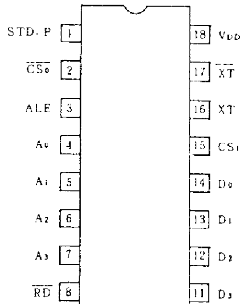
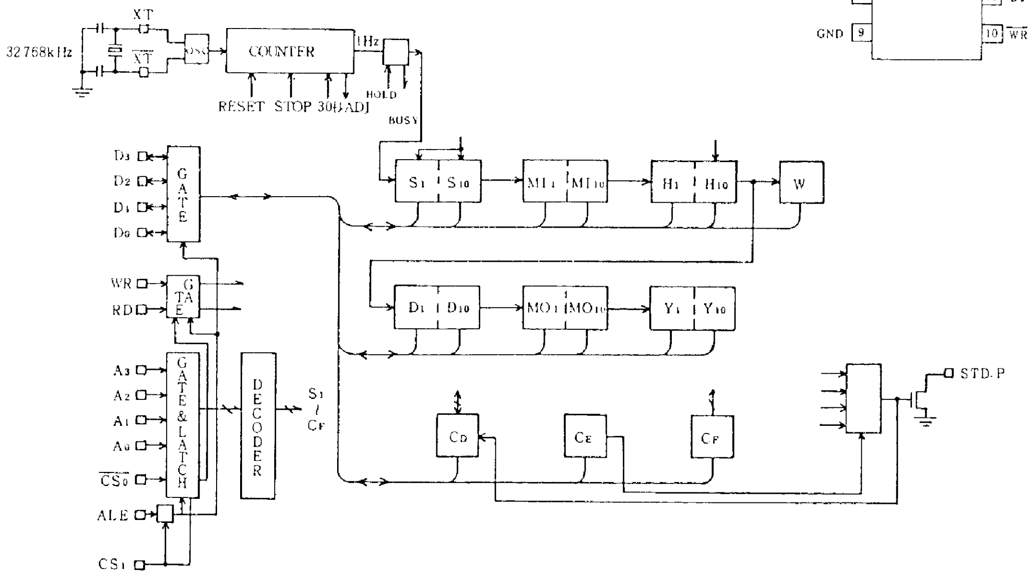
MC7906CT
Voltage Regulator



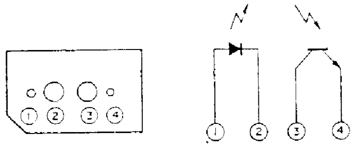
Pin 1 Ground
2. Input
3. Output

(Heatsink surface
connected to Pin2)

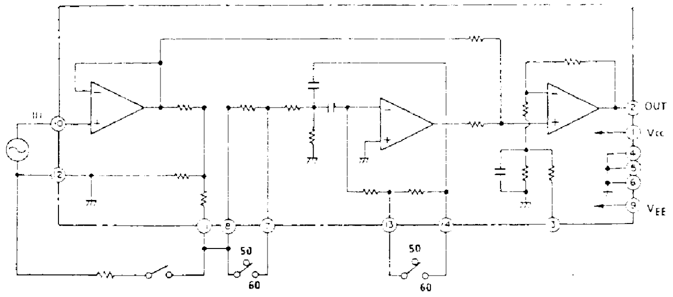
MSM6242RS
Realtime Clock



STD. P 1
CS0 2
ALE 3
A0 4
A1 5
A2 6
A3 7
RD 8
GND 9
10 WR
11 D3
12 D2
13 D1
14 D0
15 CS1
16 XT
17 XT
18 VDD
32.768kHz
XT
XT
OSC
COUNTER
1Hz
RESET
STOP
30 ADJ
HOLD
BUSY
D3
D2
D1
D0
GATE
WR
RD
GATE
A3
A2
A1
A0
CS0
ALE
CS1
GATE & LATCH
DECODER
S1 / CF
S1
S10
MI1
MI10
H1
H10
W
D1
D10
MO1
MO10
Y1
Y10
CD
CE
CF
STD. P

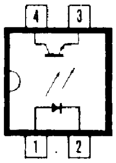
NJL5142EL-A
Photo Reflector



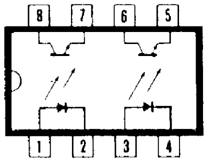
NP2014B
50/60 Notch Filter


IN
OUT
Vcc
VEE
50
60
50
60

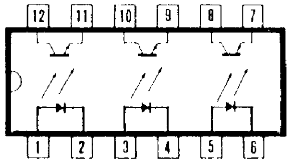
PC-827
Photocoupler



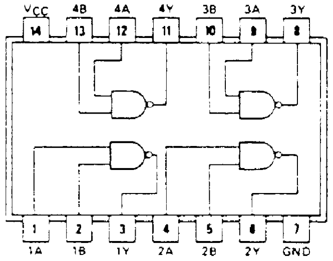
PC817
Photocoupler



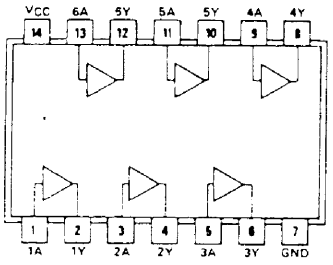
PC837
Photocoupler


12
11
10
9
8
7
1
2
3
4
5
6

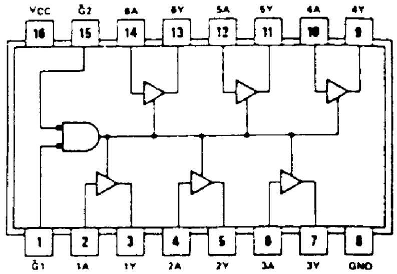
SN74HC03N
2-Input NAND Gates


VCC
4B
4A
4Y
3B
3A
3Y
14
13
12
11
10
9
8
1
2
3
4
5
6
7
1A
1B
1Y
2A
2B
2Y
GND

SN74LS07
Buffers / Drivers

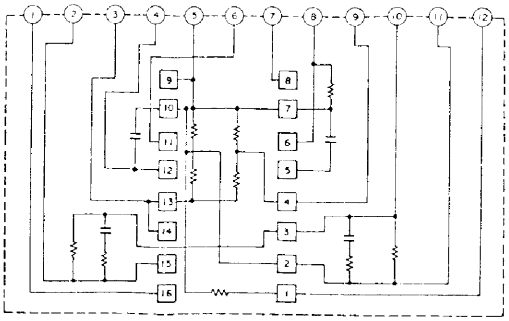

VCC
6A
5Y
5A
5Y
4A
4Y
14
13
12
11
10
9
8
1
2
3
4
5
6
7
1A
1Y
2A
2Y
3A
3Y
GND

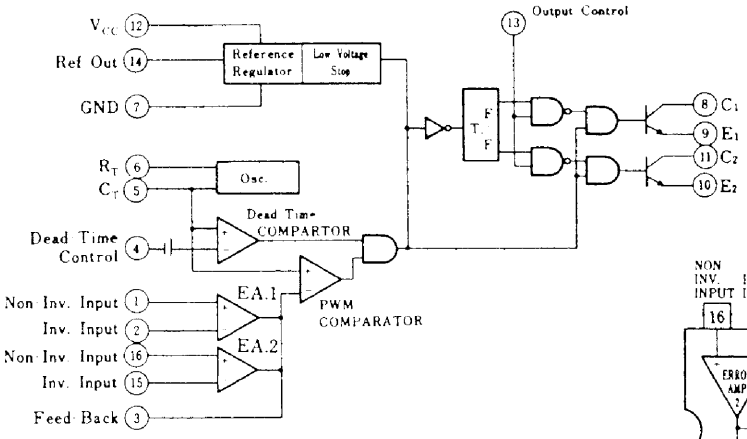
SN74LS365
Bus Drivers


VCC
Ḡ2
6A
6Y
5A
5Y
4A
4Y
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
Ḡ1
1A
1Y
2A
2Y
3A
3Y
GND

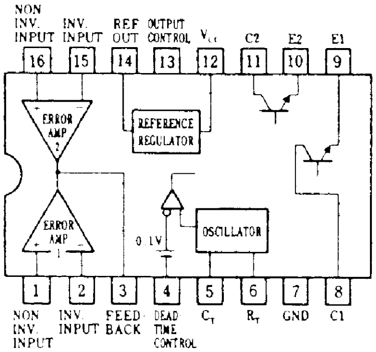
SWC-01
Switching Regulator Contoroller

µPC494G is connecteed to [1] ~ [16].


1
2
3
4
5
6
7
8
9
10
11
12
9
8
10
7
11
6
12
5
13
4
14
3
15
2
16
1

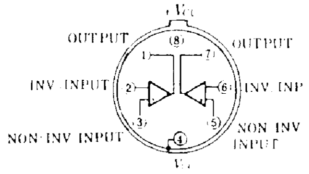

Output Control
13
V_{CC} 12
Ref Out 14
GND 7
Reference Regulator
Low Voltage Stop
T.
F
F
8 C₁
9 E₁
11 C₂
10 E₂
R_T 6
C_T 5
Osc.
Dead Time COMPARTOR
Dead Time Control 4
PWM COMPARATOR
EA.1
EA.2
Non Inv. Input 1
Inv. Input 2
Non Inv. Input 16
Inv. Input 15
Feed Back 3

Blockdiagram of µPC494G.


NON INV. INPUT
INV. INPUT
REF OUT
OUTPUT CONTROL
V_{CC}
C2
E2
E1
16
15
14
13
12
11
10
9
ERROR AMP 2
REFERENCE REGULATOR
ERROR AMP 1
0.1V
OSCILLATOR
1
2
3
4
5
6
7
8
NON INV. INPUT
INV. INPUT
FEED BACK
DEAD TIME CONTROL
C_T
R_T
GND
C1

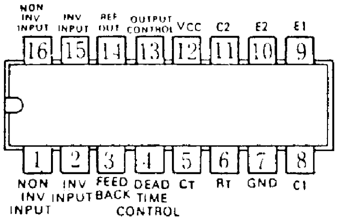
TL072CP

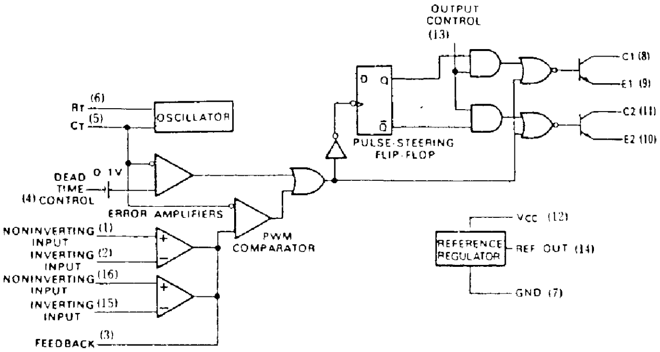
OP Amp


+Vcc
OUTPUT
(8)
OUTPUT
1
7
INV. INPUT
2
6
INV. INP
3
5
NON-INV INPUT
NON INV INPUT
4
V-

TL494CN

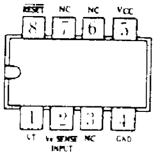
PWM Switching Regulator Controller

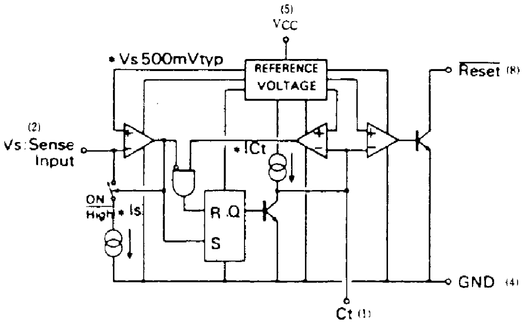

NON INV INPUT
INV INPUT
REF OUT
OUTPUT CONTROL
VCC
C2
E2
E1
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
NON INV INPUT
INV INPUT
FEED BACK
DEAD TIME CONTROL
CT
RT
GND
C1


OUTPUT CONTROL (13)
RT (6)
CT (5)
OSCILLATOR
DEAD TIME CONTROL (4)
0.1V
D
Q
Q̄
PULSE-STEERING FLIP-FLOP
C1 (8)
E1 (9)
C2 (11)
E2 (10)
ERROR AMPLIFIERS
PWM COMPARATOR
NONINVERTING INPUT (1)
INVERTING INPUT (2)
NONINVERTING INPUT (16)
INVERTING INPUT (15)
FEEDBACK (3)
VCC (12)
REFERENCE REGULATOR
REF OUT (14)
GND (7)

TL7700C

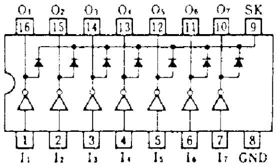
Voltage Monitor


RESET
NC
NC
VCC
8
7
6
5
1
2
3
4
CT
Vs SENSE INPUT
NC
GND


(5)
VCC
• Vs 500mVtyp
REFERENCE VOLTAGE
Reset (8)
(2)
Vs: Sense Input
• ICt
ON
High
• Is
R Q
S
GND (4)
Ct (1)

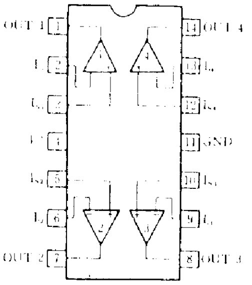
9. IC DATA

μPA2004C
Transister Array

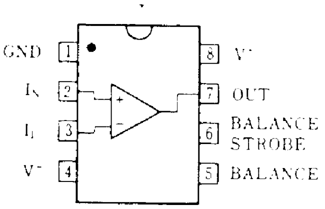

O1
O2
O3
O4
O5
O6
O7
SK
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
I1
I2
I3
I4
I5
I6
I7
GND

I : Input(Base)
O : Output(Collector)
GND(Common Emitter)

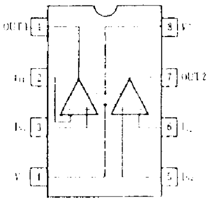
μPC1458C
μPC324C
OP Amp


OUT 1
1
2
3
4
5
6
OUT 2
7
14
OUT 4
13
12
11
GND
10
9
8
OUT 3
1
2
3
4

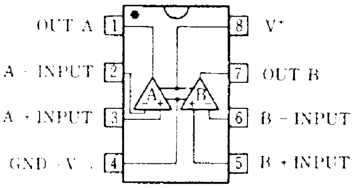
μPC271C
Comparator


GND
1
IN
2
I
3
V-
4
8
V+
7
OUT
6
BALANCE
STROBE
5
BALANCE

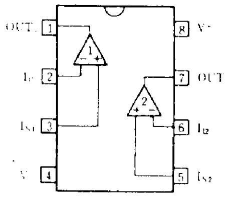
μPC358C
OP Amp


OUT1
1
2
3
V
4
8
V+
7
OUT2
6
5

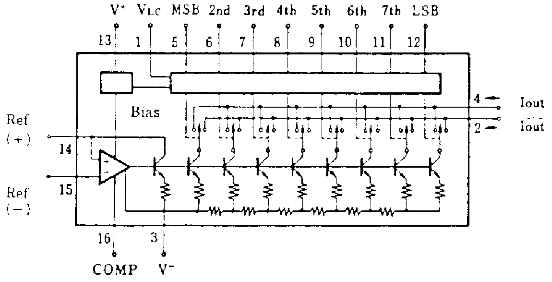
μPC393C
Comparator

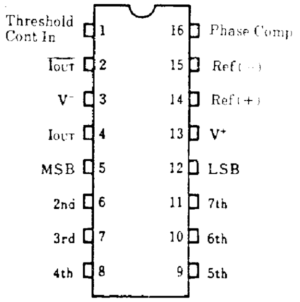

OUT A
1
A − INPUT
2
A + INPUT
3
GND · V−
4
8
V+
7
OUT B
6
B − INPUT
5
B + INPUT
A
B

μPC4570C
OP Amp

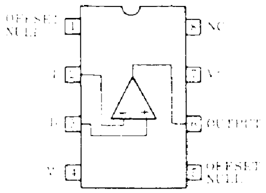

OUT1
1
2
3
V−
4
8
V+
7
OUT2
6
I2
5
IN2
1
2

μPC624C
8-Bit D/A Converter

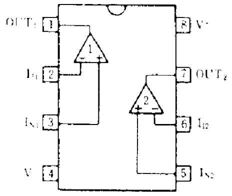

V+
VLC
MSB
2nd
3rd
4th
5th
6th
7th
LSB
13
1
5
6
7
8
9
10
11
12
Bias
4
Iout
2
Iout
Ref
(+)
14
Ref
(−)
15
16
3
COMP
V−


Threshold
Cont In
1
Iout
2
V−
3
Iout
4
MSB
5
2nd
6
3rd
7
4th
8
16
Phase Comp
15
Ref(−)
14
Ref(+)
13
V+
12
LSB
11
7th
10
6th
9
5th

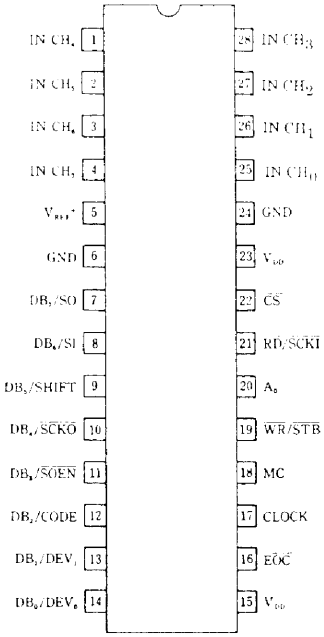
µPC811C
OP Amp

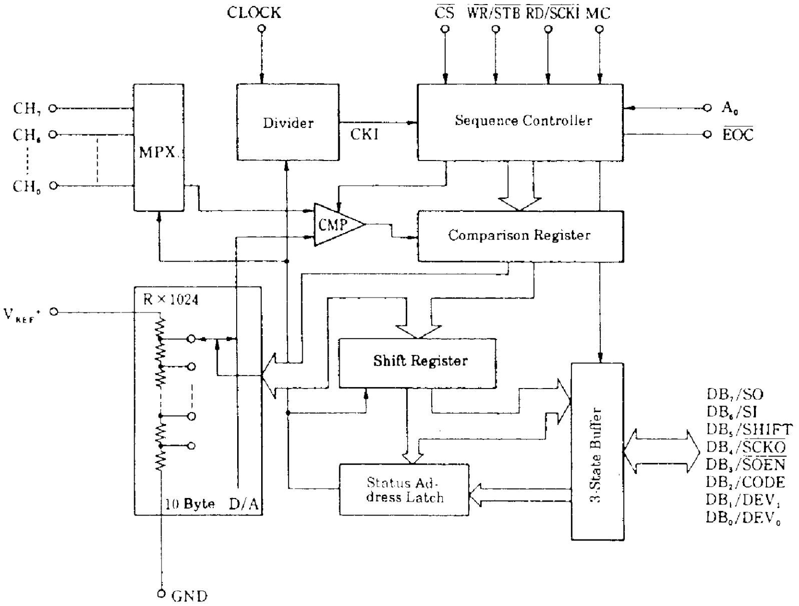

OFFSET NULL 1
I- 2
I+ 3
V- 4
8 NC
7 V+
6 OUTPUT
5 OFFSET NULL

µPC812C
OP Amp


OUT₁ 1
I_{I1} 2
I_{N1} 3
V- 4
1
2
8 V+
7 OUT₂
6 I_{I2}
5 I_{N2}

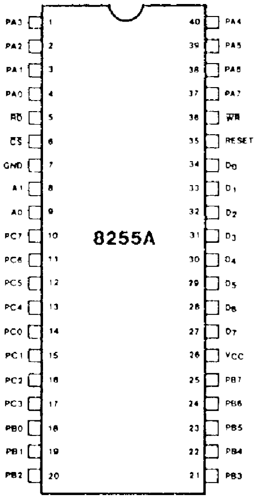
µPD-7004C
10-Bit A/D Converter

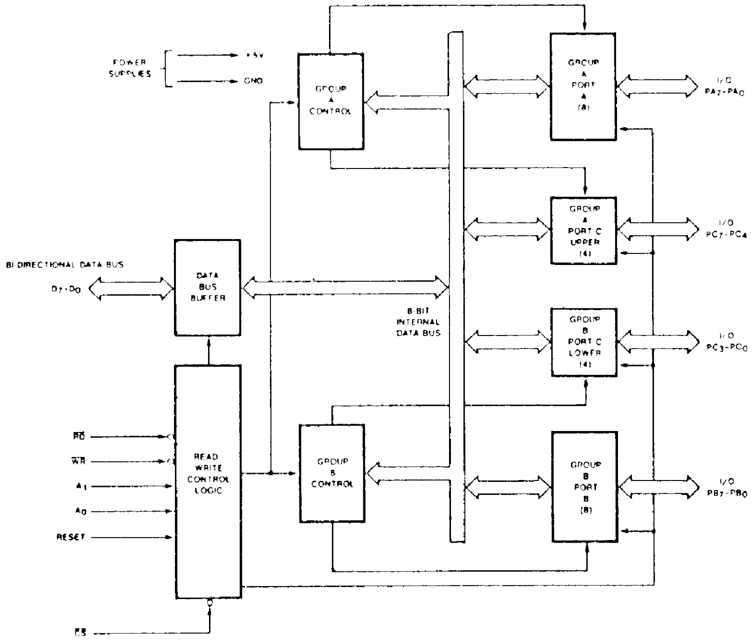

IN CH₇ 1
IN CH₆ 2
IN CH₅ 3
IN CH₄ 4
V_REF+ 5
GND 6
DB₇/SO 7
DB₆/SI 8
DB₅/SHIFT 9
DB₄/$\overline{SCKO}$ 10
DB₃/$\overline{SOEN}$ 11
DB₂/CODE 12
DB₁/DEV₁ 13
DB₀/DEV₀ 14
28 IN CH₃
27 IN CH₂
26 IN CH₁
25 IN CH₀
24 GND
23 V_DD
22 $\overline{CS}$
21 $\overline{RD}$/$\overline{SCKI}$
20 A₀
19 $\overline{WR}$/$\overline{STB}$
18 MC
17 CLOCK
16 $\overline{EOC}$
15 V_DD


CLOCK
$\overline{CS}$
$\overline{WR}$/$\overline{STB}$
$\overline{RD}$/$\overline{SCKI}$
MC
CH₇
CH₆
CH₀
MPX
Divider
CKI
Sequence Controller
A₀
$\overline{EOC}$
CMP
Comparison Register
V_REF+
R × 1024
10 Byte D/A
Shift Register
Status Address Latch
3-State Buffer
DB₇/SO
DB₆/SI
DB₅/SHIFT
DB₄/$\overline{SCKO}$
DB₃/$\overline{SOEN}$
DB₂/CODE
DB₁/DEV₁
DB₀/DEV₀
GND

μPD71055C

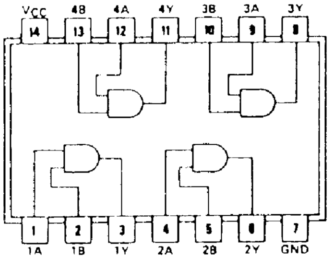
Programmable
Peripheral Interface


8255A
PA3 1
PA2 2
PA1 3
PA0 4
RD 5
CS 6
GND 7
A1 8
A0 9
PC7 10
PC6 11
PC5 12
PC4 13
PC0 14
PC1 15
PC2 16
PC3 17
PB0 18
PB1 19
PB2 20
40 PA4
39 PA5
38 PA6
37 PA7
36 WR
35 RESET
34 D0
33 D1
32 D2
31 D3
30 D4
29 D5
28 D6
27 D7
26 VCC
25 PB7
24 PB6
23 PB5
22 PB4
21 PB3


POWER SUPPLIES
+5V
GND
GROUP A CONTROL
GROUP A PORT A (8)
I/O PA7-PA0
GROUP A PORT C UPPER (4)
I/O PC7-PC4
BI-DIRECTIONAL DATA BUS
D7-D0
DATA BUS BUFFER
8-BIT INTERNAL DATA BUS
GROUP B PORT C LOWER (4)
I/O PC3-PC0
RD
WR
A1
A0
RESET
READ WRITE CONTROL LOGIC
GROUP B CONTROL
GROUP B PORT B (8)
I/O PB7-PB0
CS

μPD74HC08C

2-Input AND Gates

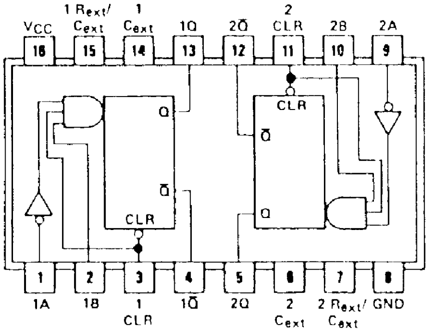

VCC 14
4B 13
4A 12
4Y 11
3B 10
3A 9
3Y 8
1A 1
1B 2
1Y 3
2A 4
2B 5
2Y 6
GND 7

μPD74HC123C

Retriggerable
Monostable
Multivibrator

'123, 'L123, 'LS123
FUNCTION TABLE

INPUTS			OUTPUTS	
CLEAR	A	B	Q	$\bar{Q}$
L	X	X	L	H
X	H	X	L	H
X	X	L	L	H
H	L	↑	⊓	⊔
H	↓	H	⊓	⊔
↑	L	H	⊓	⊔


VCC 16
1 Rext/Cext 15
1 Cext 14
1Q 13
2Q̄ 12
2 CLR 11
2B 10
2A 9
Q
Q̄
CLR
Q̄
Q
CLR
1A 1
1B 2
1 CLR 3
1Q̄ 4
2Q 5
2 Cext 6
2 Rext/Cext 7
GND 8

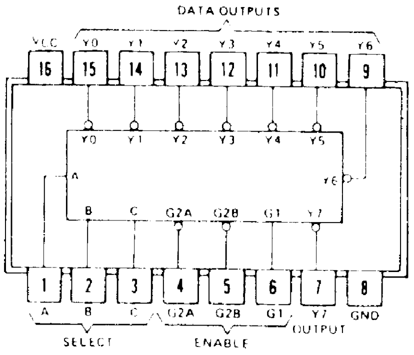
μPD74HC138C
Decoders / Demultiplexer

'LS138, 'S138
FUNCTION TABLE

INPUTS					OUTPUTS							
ENABLE		SELECT										
G1	G2*	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	H	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	H	H	H	H	H	L	H	H	H	H
H	L	H	L	L	H	H	H	H	L	H	H	H
H	L	H	L	H	H	H	H	H	H	L	H	H
H	L	H	H	L	H	H	H	H	H	H	L	H
H	L	H	H	H	H	H	H	H	H	H	H	L

*G2 = G2A + G2B

H = high level, L = low level, X = irrelevant

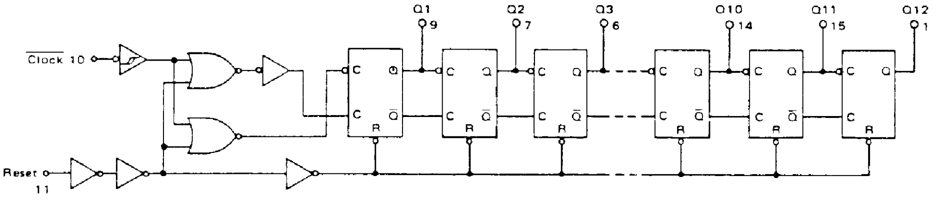

DATA OUTPUTS
VCC
Y0
Y1
Y2
Y3
Y4
Y5
Y6
16
15
14
13
12
11
10
9
Y0
Y1
Y2
Y3
Y4
Y5
A
Y6
B
C
G2A
G2B
G1
Y7
1
2
3
4
5
6
7
8
A
B
C
G2A
G2B
G1
Y7
GND
OUTPUT
SELECT
ENABLE

μPD74HC4040C
12-Bit Binary Counter

TRUTH TABLE

CLOCK	RESET	OUTPUT STATE
↑	0	No Change
↓	0	Advance to next state
X	1	All Outputs are low

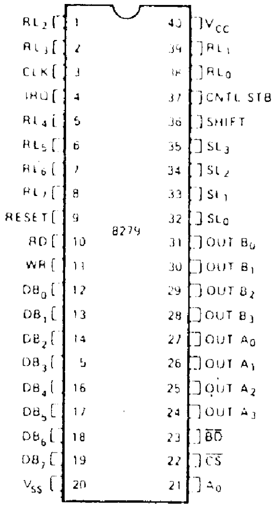
X = Don't Care

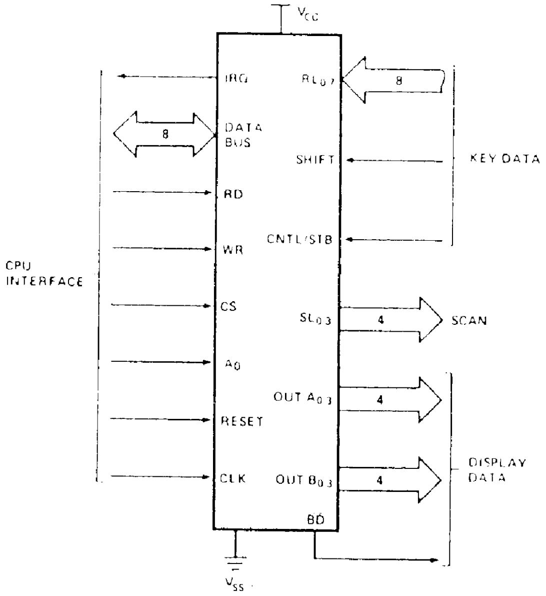

Q1
9
Q2
7
Q3
6
Q10
14
Q11
15
Q12
1
Clock 10
Reset
11
C
Q
R

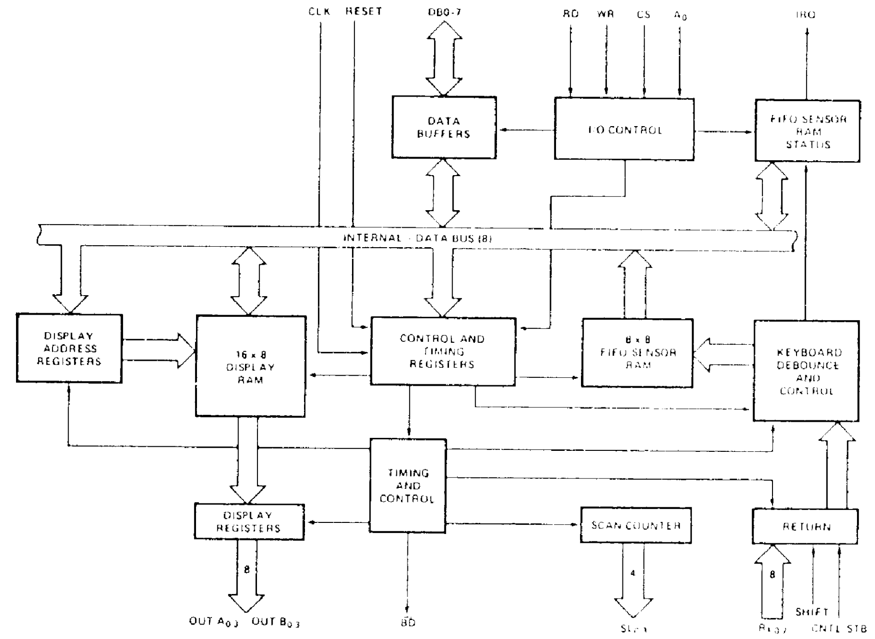
Q4 = Pin 5
Q5 = Pin 3
Q6 = Pin 2
Q7 = Pin 4
Q8 = Pin 13
Q9 = Pin 12

V_{DD} = Pin 16
V_{SS} = Pin 8

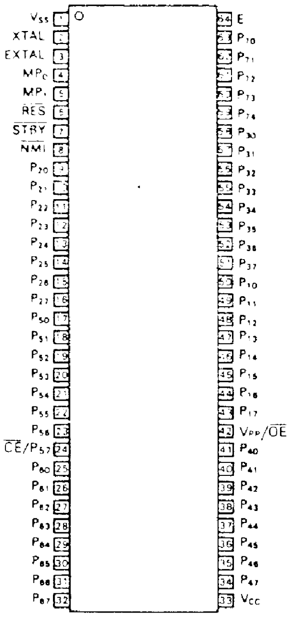
µPD8279C-2
Programmable Keyboard / Interface

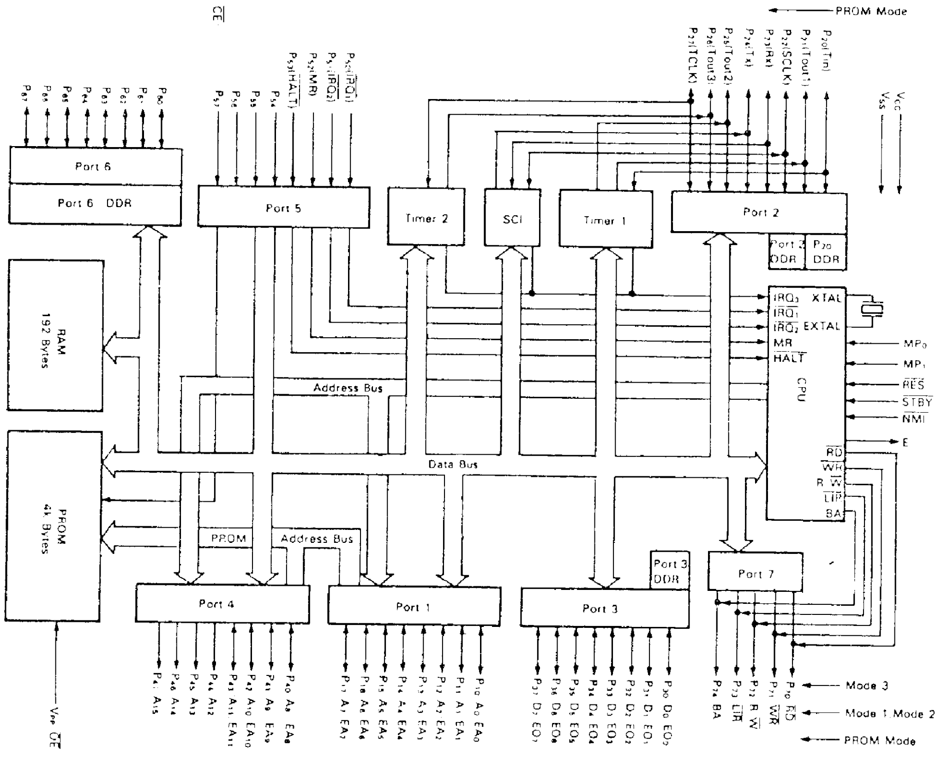

8279
RL2 1
RL3 2
CLK 3
IRQ 4
RL4 5
RL5 6
RL6 7
RL7 8
RESET 9
RD 10
WR 11
DB0 12
DB1 13
DB2 14
DB3 15
DB4 16
DB5 17
DB6 18
DB7 19
VSS 20
40 VCC
39 RL1
38 RL0
37 CNTL STB
36 SHIFT
35 SL3
34 SL2
33 SL1
32 SL0
31 OUT B0
30 OUT B1
29 OUT B2
28 OUT B3
27 OUT A0
26 OUT A1
25 OUT A2
24 OUT A3
23 BD
22 CS
21 A0


VCC
IRQ
DATA BUS
8
RD
WR
CS
A0
RESET
CLK
CPU INTERFACE
RL0-7
8
SHIFT
CNTL/STB
KEY DATA
SL0-3
4
SCAN
OUT A0-3
4
OUT B0-3
4
DISPLAY DATA
BD
VSS


CLK
RESET
DB0-7
RD
WR
CS
A0
IRQ
DATA BUFFERS
I/O CONTROL
FIFO/SENSOR RAM STATUS
INTERNAL DATA BUS (8)
DISPLAY ADDRESS REGISTERS
16 x 8 DISPLAY RAM
CONTROL AND TIMING REGISTERS
8 x 8 FIFO/SENSOR RAM
KEYBOARD DEBOUNCE AND CONTROL
TIMING AND CONTROL
DISPLAY REGISTERS
SCAN COUNTER
RETURN
8
OUT A0-3 OUT B0-3
BD
4
SL0-3
8
RL0-7
SHIFT
CNTL STB

HD637B01X0
CPU


VSS 1
XTAL 2
EXTAL 3
MP0 4
MP1 5
RES 6
STBY 7
NMI 8
P20 9
P21 10
P22 11
P23 12
P24 13
P25 14
P26 15
P27 16
P50 17
P51 18
P52 19
P53 20
P54 21
P55 22
P56 23
CE/P57 24
P60 25
P61 26
P62 27
P63 28
P64 29
P65 30
P66 31
P67 32
64 E
63 P70
62 P71
61 P72
60 P73
59 P74
58 P30
57 P31
56 P32
55 P33
54 P34
53 P35
52 P36
51 P37
50 P10
49 P11
48 P12
47 P13
46 P14
45 P15
44 P16
43 P17
42 VPP/OE
41 P40
40 P41
39 P42
38 P43
37 P44
36 P45
35 P46
34 P47
33 VCC


CE
PROM Mode
Port 6
Port 6 DDR
Port 5
Timer 2
SCI
Timer 1
Port 2
Port 2 DDR
P20 DDR
RAM 192 Bytes
PROM 4k Bytes
Address Bus
Data Bus
PROM
Address Bus
CPU
IRQ3
IRQ1
IRQ2
MR
HALT
XTAL
EXTAL
MP0
MP1
RES
STBY
NMI
E
RD
WR
R/W
LIR
BA
Port 4
Port 1
Port 3
Port 3 DDR
Port 7
VCC
VSS
VPP OE
Mode 3
Mode 1 Mode 2
PROM Mode

Section 10 SIGNAL ABBREVIATION LIST

* : Used within one PCB

Symbol	Function
AC	AC power detection
ADCLK*	Clock pulse for A/D convertor
ART	Artifact (leads off) signal for telemeter
AUX	Auxiliary input
A0 ~ A15*	Address
BA*	Bus available
BACK UP*	Back up power supply of lithium battery
BAT +	Battery terminal, positive
BAT –	Battery terminal, negative
BATTCHG	"BATT CHG" (battery charging) LED control
BATTOFF	Battery power off
BELLADJ	Beep volume control out
BELLIN	Beep volume control in
BELLOUT	Beep out
BLANK	Blanking pulse for CRT
BRIGHT	Sync spot display control
BUCONT*	Battery back up control for host CPU RAM and ECG CPU RAM
C	Chest lead ECG
CAL *	Calibration control
CALDISP *	Calibration display control
CALL	Nurse call signal from transmitter
CHANNEL AD	Voltage corresponding to channel being received via optional receiver
CHGAD	Charged voltage for A/D conversion
CHGLED	Charge LED display control
CHGON	Energy charge control
CH1 /CH2	CH1 / CH2 trace selection
CLK	Clock signal for serial communication with optional unit
CNTL	CAL key entry
CSAD *	Chip select for A/D converter
CSCRT *	Chip select for CRT RAM and gate control for CRT CPU data bus buffer
CSECG *	Chip select for ECG RAM and direction control for ECG CPU data bus buffer
CSRAM	Chip select for host CPU RAM

10. SIGNAL ABBREVIATION LIST

* : Used within one PCB

Symbol	Function
CSRAM-A	Chip select for ECG CPU RAM
DCHGCHK	Discharge check
DIP0	Time constant selection (ECG / MON)
DIP1	AC filter on / off
DIP2	Alarm recording on / off
DIP3	Auto recording on / off
DIP4	Paper sensitivity, high / low
DIP5	Lead all / P, I , II , III
DIP6	Recording mode, realtime / delay
DIP7	Paddle sync on / off
DISPSEL	Display mode select key
DISP0 ~ DISP2 *	LED display control
D0 ~ D7	Data bus
EA	Ground for analog circuits
ED	Ground for digital circuits
ER	Ground for recorder
EY	Ground for CRT
ECGOUT	ECG signal for A/D conversion in optional unit
ECHG	Ground for + 12 V
ENB	Recording enable
ENRGADJ	Energy adjustment voltage
ESEL0 ~ ESEL3	Energy selector switch position code
EOC *	End of A / D conversion
EXCHG	Charge signal form paddle
EXDISCHG	Discharge signal form paddle
EXIST	Not used
EXTRLY	External discharge relay control
EXTECG	External ECG output
FEEDA	Paper sensor, anode
FEEDC	Paper sensor, collector
FEEDE	Paper sensor, emitter
FEEDK	Paper sensor, cathode

* : Used within one PCB

Symbol	Function
GAIN0 ~ GAIN2 *	ECG gain contol
HALTCRT	Halt signal for CRT CPU
HALTECG	Halt signal for ECG CPU
HSYNC	Syncronization signal for horizontal deflection
HUMFIL	AC filter control
INST *	INST (reset) control
INST-1*	INST control
INST-2	Not used
INTRLY	Internal discharage relay control
INTEN1 ~ INTEN3 *	Intensity control VR terminals
LA	ECG signal, left arm
LED +	Battery detection switch, commom
LED –	Battery detection switch
LEDGR	Paddle LED control, green
LEDRED	Paddle LED control, red
LEDYEL	Paddle LED control, yellow
LFAULT	Lead fault (leads off)
LL	ECG signal, left leg
LOWCUT *	Low cut filter control
LURCOM	Thermal head detection switch, common
LURNO	Thermal head detection switch, normally open
MAKPLS	Not used
MOTOR1 ~ MOTOR2	Motor drive sisgnal
NOPAPER	Thermal head and paper detection
OPTION*	Select signal of ECG from interface unit
OP.ECGx5	ECG signal (5mV/mV) from interface unit
OVERCHG	Overcharge detection
PADL1~ PADL2	Paddle type discrimination
PCREF *	Clock for paddle contact excitor, 50KHz
PCAD	Paddle contact signal for A / D conversion
PECGA	Paddle lead ECG, apex
PECGS	Paddle lead ECG, sternum

10. SIGNAL ABBREVIATION LIST

* : Used within one PCB

Symbol	Function
POWERON	Power on signal from energy selector
PRTCLK	Clock for recorder
RA	ECG signal, right arm
RCVFLT	Receiving fault
RD *	Read
REC	Recorder motor control
REF *	Reference voltage +4 V
RL	ECG signal, right leg
RST *	Reset for all CPUs
RTC *	Realtime clock, 2 ms
R0 ~ R3	Return line from sheet key
RxD	Reception data for serial communication with optional unit
SEL0 ~ SEL4 *	Input selection control
SENSA	Paper sensor, anode
SENSC	Paper sensor, collector
SENSE	Paper sensor, emitter
SENSK	Paper sensor, cathode
SENSOUT	Rotation sensor output
SENS +	Rotation sensor, positive
SENS –	Rotation sensor, negative
SH	Shield for ECG signal
SIN	Recording data (Serial in)
SOUT	Recording data of the previous line to avoid successive printing (Serial out)
STB	Strobe signal for recorder
S0 ~ S3	Scan line for sheet key entry and LED display control
TCLK *	Clock for test waveform
TC 0.1*	Select signal of time constant of 0.1 sec
TELE	Telemetry singal receiving
TELEW	Telemetry waveform
TTROUT	Integrated value of change of discharge current (output of TTR measuring circuit)
TTRRST	Reset for TTR measuring circuit

* : Used within one PCB

Symbol	Function
TxD	Transmission data for serial communication with optional unit
VSYNC	Synchronization signal for vertical deflection
WAVE /CHR	Waveform / character selection control
WR *	Write
X1, X2	Horizontal deflection yoke signal
YSIG	Waveform signal for CRT
YP1, YP2	Vertical deflection poisition yoke signal
Y1, Y2	Vertical deflection yoke signal
ZBB	Transmitter battery level low signal
ZBECG +	Transmitter ECG signal
50KHz *	ECG floating clock
8MHzCLK	Clock for CPU
+ 5V	+ 5 V for digital circuits
− 6V	− 6 V for analog circuits
+ 6V	+ 6 V foranalog circuits
− 8.5V	− 8.5V for CRT
+ 8.5V	+ 8.5V for CRT
+ 12VCHG	Unregulated + 12 V
+ 12V	+ 12 V for CRT
+ 12VREC	+ 12 V for recorder
+ 12V$_B$	Unregulated + 12 V
12MHz CLK*	Clock of host CPU and ECG CPU
25/5 mm/s	Paper speed selection

Section 11 CIRCUITS DIAGRAMS & PARTS LOCATIONS

CONTENTS

DWG NO. PAGE

TEC-7100
TEC-7200

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CONNECTOR PIN ASSIGNMENT (3 / 3) -------- 104713 11.5

TEC-7300

BOARD CONNECTION -------------------- 105560 11.41
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CONNECTOR PIN ASSIGNMENT (3 / 3) -------- 105558 11.45

TEC-7100
TEC-7200
TEC-7300

UP-76351 (7100)
UP-7635 (7200) ECG / CPU BD

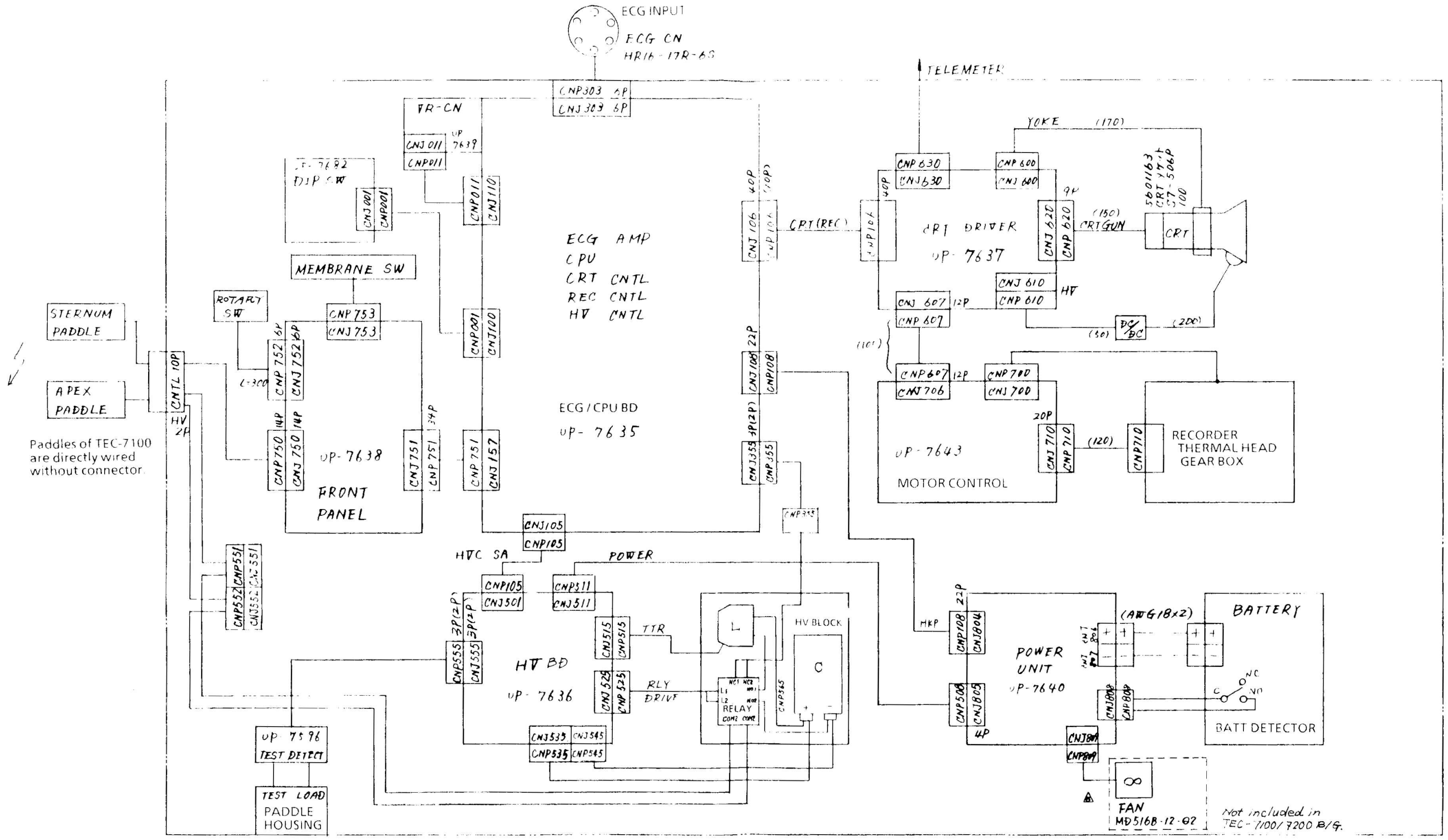
ECG / CPU (1 / 5) MAIN ------------------ 104628 11.7
ECG / CPU (2 / 5) ECG 2 ------------------ 104627 11.9
ECG / CPU (3 / 5) ECG 1 ------------------ 104626 11.11
ECG / CPU (4 / 5) CRT ------------------- 104629 11.13
ECG / CPU (5 / 5) CONNECTOR ------------- 104640 11.15

UP-7737 (7300) ECG / CPU BD

ECG / CPU (1 / 5) MAIN ------------------ 105526 11.47
ECG / CPU (2 / 5) ECG 2 ------------------ 105525 11.49
ECG / CPU (3 / 5) ECG 1 ------------------ 105524 11.51
ECG / CPU (4 / 5) CRT ------------------- 105527 11.53
ECG / CPU (5 / 5) CONNECTOR ------------- 105528 11.55

UP-7851 (7100/7200/7300 G) UP-7636 (Others)	HIGH VOLTAGE BD	106732 104630	11.59 11.17
UP-7850 (7300G)	RELAY BD	106732	11.59
UP-7596	TEST DETECT BD	104630	11.17
UP-7740	CRT DRIVER	105662	11.19
UP-7638	FRONT PANEL BD	104633	11.21
UP-7639#	VR AND CONNECTOR BD	104634	11.23
UP-7682	DIP SW BD	104634	11.23
WS-701V# (7100/7200) WS-702V# (7300)	RECORDER	104714 105561	11.25 11.57
UP-7738	MOTOR CONTROL BD	105529	11.27
SC-701V#	POWER UNIT		
UP-7720 (TEC-7100/7200/7300 B, G) UP-7640 (Other models)	SW REGULATOR	105301 104796	11.29 11.31
ND-701V# (7100) ND-702V# (7200/7300)	EXTERNAL PADDLE	104717 104636	11.33 11.35
ND-723V ND-725V ND-727V	INTERNAL PADDLE	104637	11.37
ND-704V#	ANT-POST PADDLE	104638	11.39

Units with # mark differ according to the model.
See pages 1.7 and 1.8 for units with # mark.


ECG INPUT
ECG CN
HR16-17R-6S
CNP303 6P
CNJ303 6P
VR-CN
CNJ011
CNP011
UP 7639
UP-7682
DIP SW
CNJ001
CNP001
CNP011
CNJ110
MEMBRANE SW
ROTARY SW
CNP753
CNJ753
STERNUM PADDLE
APEX PADDLE
CNTL 10P
HV 2P
L=300
CNP752 6P
CNJ752 6P
CNP750 14P
CNJ750 14P
UP-7638
FRONT PANEL
CNJ751 34P
CNP751
CNP751
CNJ157
CNP001
CNJ100
ECG AMP
CPU
CRT CNTL
REC CNTL
HV CNTL
ECG / CPU BD
UP-7635
CNJ106 40P
CNP106 (40P)
CNJ108 22P
CNP108
CNJ355 3P(2P)
CNP355
CNJ105
CNP105
HVC SA
POWER
CNP105
CNJ501
CNP511
CNJ511
CNP552
CNJ552
CNP551
CNJ551
CNP555 3P(2P)
CNJ555 3P(2P)
HV BD
UP-7636
CNJ515
CNP515
TTR
CNJ525
CNP525
RLY DRIVE
CNJ535
CNP535
CNJ545
CNP545
L
RELAY
NC1 NC2
L1 L2
NO1 NO2
COM1 COM2
HV BLOCK
C
CNP565
CNP355
UP 7596
TEST DETECT
TEST LOAD
PADDLE HOUSING
TELEMETER
CRT (REC)
CNP106 40P
CNP630
CNJ630
CNP600
CNJ600
YOKE (170)
CRT DRIVER
UP-7637
CNJ620 9P
CNP620
(150) CRT GUN
5601163 CRT ユニット 57-506P 100
CRT
CNJ610
CNP610
HV
CNJ607 12P
CNP607
DC/DC
(50)
(200)
(100)
CNP607 12P
CNJ706
CNP700
CNJ700
UP-7643
MOTOR CONTROL
CNJ710 20P
CNP710
(120)
CNP710
RECORDER
THERMAL HEAD
GEAR BOX
HKP
CNP108 22P
CNJ804
CNP508
CNJ805 4P
POWER UNIT
UP-7640
CNT 806
CNT 807
(AWG18×2)
BATTERY
+ +
− −
CNJ808
CNP808
C NC NO
BATT DETECTOR
CNJ809
CNP809
FAN
MD516B-12-02

Paddles of TEC-7100 are directly wired without connector.

Not included in TEC-7100/7200 B/G.

6

B	2		62 1 21		DWG NO	104783B
A	2		61 11 4		MODEL	TEC-7100 TEC-7200
REVIS	REASON		DATE		NAME	BOARD CONNECTION

APPD
CHK 2
CHK 1
DESIGN
TRACE

添付図

所属図

CNJ 057 (CHASSIS)

to CNJ 750 (FRONT PANEL)
HKP-14MS-7BT

	1	—	1	$\overline{\text{EX-CHG}}$
	2	—	2	PADL 2
	3	—	3	PADL 1
フロントパネル	4	—	4	CHG-LED
to CNJ750	5	—	5	ED
	7	—	6	$\overline{\text{EX-DISCHG}}$
	8	—	7	LED-GR
	9	—	8	LED-YEL
	10	—	9	LED-RED
HV		—	10	SHIELD

CNJ 100 (CPU)
M60-12-30-114P

to CNJ 001 (DIPSW)
M60-12-30-114P

	—	1	DIP-0
	—	2	DIP-1
	—	3	DIP-2
	—	4	DIP-3
	—	5	DIP-4
	—	6	DIP-5
	—	7	DIP-6
	—	8	DIP-7
	—	9	ED
	—	10	ZBECG+
	—	11	EA
	—	12	

CNJ 105 (CPU)
M60-15-30-114

to CNJ 501 (HV)
M60-15-30-114

		1	CHG ON
		2	INT-RLY
		3	EXT-PLY
		4	$\overline{\text{DCHG CHK}}$
		5	TTRRST
		6	TTR OUT
		7	OVER-CHG
		8	CHG AD
		9	
		10	+8.5V
		11	EA
		12	-8.5V
		13	ENRG ADJ
		14	
		15	

CNJ 106 (CPU)
H4F3A5B 40D A

to CNJ 601 (CRT, REC)

12V REC	1	2	$\overline{\text{SOUT}}$
ER	3	4	ER
-6V	5	6	+5V
+6V	7	8	-8.5V
+8.5V	9	10	12V CRT
$\overline{\text{SIN}}$	11	12	STB
PRT CLK	13	14	$\overline{\text{ENB}}$
REC	15	16	NO PAPER
EY	17	18	EY
CH1/ $\overline{\text{CH2}}$	19	20	V SYNC
HSYNC	21	22	
BLANK1	23	24	WAVE/ $\overline{\text{CHR}}$
BRIGHT	25	26	Y SIG
INTENS-3	27	28	INTENS-2
INTENS-1	29	30	EA
TELEW	31	32	$\overline{\text{ART}}$
$\overline{\text{RCVFLT}}$	33	34	$\overline{\text{TELE}}$
$\overline{\text{CALL}}$	35	36	$\overline{\text{ZBB}}$
TELE SEL	37	38	+12VB
ED	39	40	ED

CNJ 108 (CPU)
HKP 22MS-11BT

to CNJ 804 (POWER)
HKP-22MS-11BT

EA	1	2	EA
ED	3	4	ED
ER	5	6	ER
EY	7	8	EY
-6V	9	10	+5V
+6V	11	12	-8.5V
+8.5V	13	14	+12V CRT
BAT CHG	15	16	+12V REC
AC	17	18	BATT OFF
POWER ON	19	20	+12VB
	21		

CNJ 110 (CPU)
M60-12-30-114
to CNJ011 (VR CONNECTOR BD)
M60-12-30-114

		1	INTENS-1	
		2	INTENS-2	
		3	INTENS-3	
		4	BELL IN	
		5	BELL ADJ	
		6	~~EX SYNC~~	△1
		7	AUX	
		8	EXT ECG	
		9	EA	
		10	~~EXTOT~~	△3
		11	~~MRKPLS~~	△1
		12		

6

△×				承認 APPD	
△×				検図 2 CHK 2	
△×				検図 1 CHK 1	小田
△×				設計 DESIGN	小田
△×					
△×					
△× 3	31	62 / 20		写図 TRACE	斎藤
変更 REVIS	理由 REASON	年 月 日 DATE	検図 CHK		

DWG NO 104711A

MODEL TEC-7100
TEC-7200

NAME CONNECTOR
PIN ASSIGN-
MENT (1/3)

添付図

所属図

CNJ 157 (CPU)
HiF3FB-34PA-2.54DS
to CNP751 (FRONT PANEL)
HiF2.3A-34D-BC(10)

So	1	2	S1
S2	3	4	S3
RO	5	6	R1
R2	7	8	R3
ESEL 0	9	10	ESEL-1
ESEL-2	11	12	ESEL-3
DISP-0	13	14	DISP-1
DISP-2	15	16	$\overline{\text{EX-CHG}}$
$\overline{\text{EX-DISCHG}}$	17	18	LED-RED
LED-YEL	19	20	LED-GR
CHG-LED	21	22	PADL 1
PADL 2	23	24	BELL OUT
$\overline{\text{CNTL}}$	25	26	BATTCHG
ED	27	28	+5V
ED	29	30	+5V
POWER ON	31	32	+12VB
—	33	34	—

CNJ 303 (ECG AMP)
M60-15-30-114
to CNJ 003 (ECG CONNECTOR)
HR16-17R-6S

		1	RA (R)
		2	—
		3	—
		4	LA (L)
		5	—
		6	—
		7	LL (F)
		8	—
		9	—
		10	RL (RF)
		11	—
		12	—
		13	V (C)
		14	—
		15	SHIELD

CNJ511 (−V)
350543-1 (AMP)
to CNJ 805 (POWER)
350543-1 (AMP)

		1	+12VCHG
		2	+12VCHG
		3	ECHG
		4	ECHG

CNJ 355 (ECG AMP)
M60-3-30-114
to CNJ 553 (HV UNIT)
M60-3-30-114

		1	P-ECG S
		2	—
		3	P-ECG A

CNJ 600 (CRT)
HKF [illegible]0M5S-1T
to YOKE

		1	X1
		2	X2
		3	Y1
		4	Y2
		5	YF2
		6	YF1

CNJ 607 (CRT)
M60-12-30-114
to CNJ 706 (REC)
M60-12-30-114

		1	ER
		2	ER
		3	+12VREC
		4	$\overline{\text{SIN}}$
		5	STB
		6	PRT CLK
		7	$\overline{\text{ENB}}$
		8	+5V
		9	REC
		10	NOPAPER
		11	EL
		12	$\overline{\text{SOUT}}$

CNJ 620 (CRT)
M60-9-30-114
to CRT NECK
S7-506P-100

		1	G1
		2	K
		3	H
		4	H
		5	
		6	G2
		7	G4

CNJ 808 (POWER)
171825-2
to BATTERY

		1	LED +
		2	LED −

CNJ 80[illegible] (POWER
170267-1
to BATTERY

		1	BAT +

CNJ [illegible] R)
170267-1
to BATTERY

		1	BAT −

6

△×
△×
△×
△×
△×
△×
△×

承認 APPD		DWG NO	104712
検図 2 CHK 2		MODEL	TEC-7100 TEC-7200
検図 1 CHK 1	小林		
設計 DESIGN	小林	NAME	CONNECTOR PIN ASSIGN-

赤付図

CNJ 630 (CRT)
M60-15-30-134
to TELEMETER

	1	2	
+5V	3	4	-6V
+6V	5	6	ED
EA	7	8	+12VB
TELE SEL	9	10	ZBB
CALL	11	12	$\overline{\text{TELE}}$
RCVFLT	13	14	$\overline{\text{ART}}$
TELER	15		

CNJ 700 (REC)
M60-11-30-114
to RECORDER

		1	SENS-A
		2	SENS K
		3	SENS-E
		4	SENS C
		5	LUR-COM
		6	LUR-N.O
		7	SENS-−
		8	SENS-+
		9	SENS-OUT
		10	MOTOR1
		11	MOTOR2
		12	FEED-A
		13	FEED-K
		14	FEED-C
		15	FEED-E

CNJ 710 (REC)
HKP-20MS10BT
to (THERMAL HEAD)

ER	1	2	ER
ER	3	4	ER
STB	5	6	ER
ED	7	8	CLK
+9V	9	10	$\overline{\text{SIN}}$
+9V	11	12	+9V
	13	14	+9V
	15	16	
$\overline{\text{SOUT}}$	17	18	$\overline{\text{ENB}}$
+5V	19	20	

CNJ 750 (FRONT PANEL)
HKP-14MS-9BT
to CNJ 057 (PADDLE CONNECTOR)

$\overline{\text{EX-CHG}}$	1	2	PADL 2
PADL 1	3	4	CHG-LED
ED	5	6	$\overline{\text{EX-DISCHG-A}}$
$\overline{\text{EX-DISCHG}}$	7	8	LED-GR
LED-YEL	9	10	LED-RED
ED	11	12	$\overline{\text{EX-DISCHG-S}}$
—	13	14	—

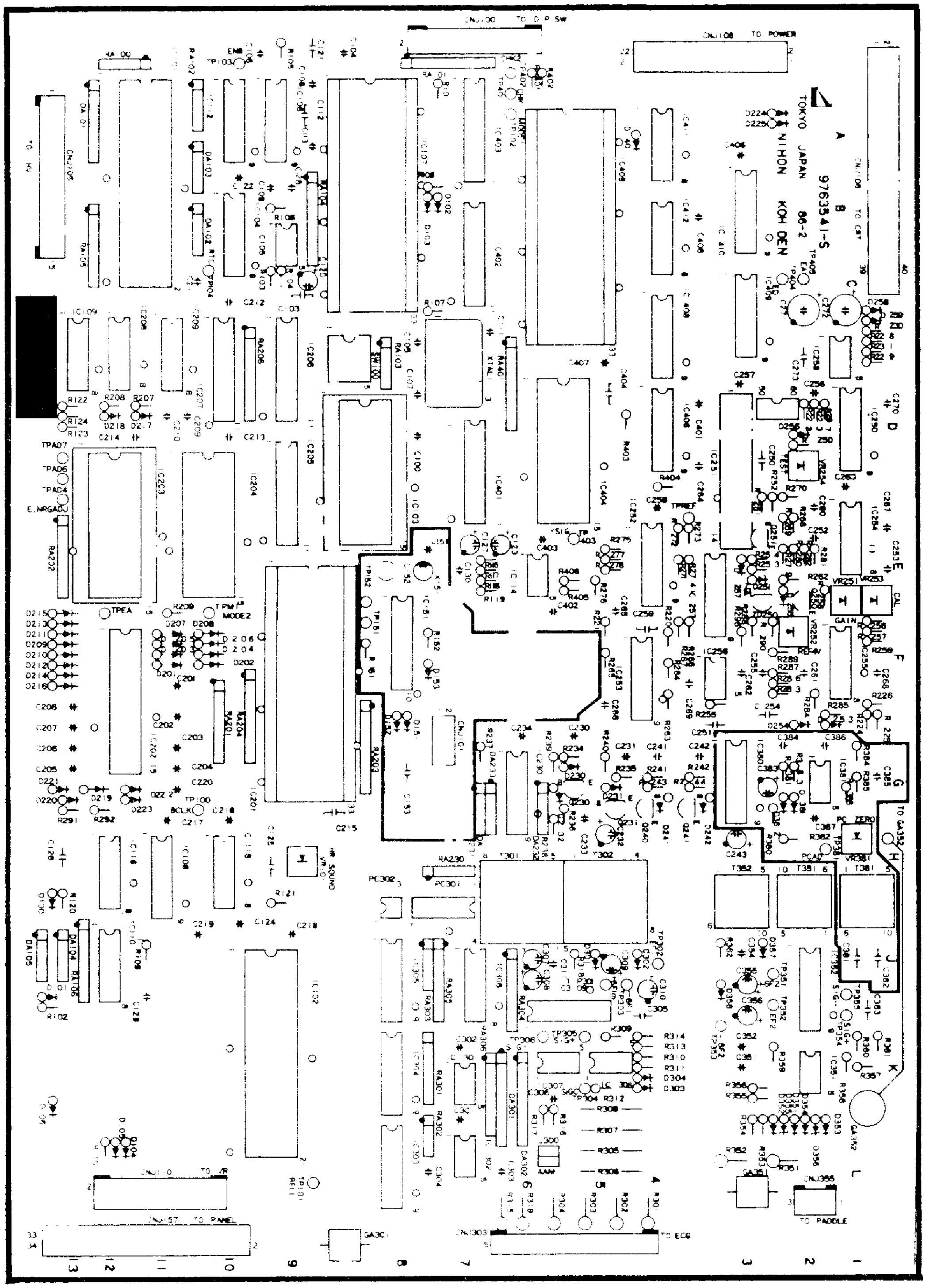
Paddles of TEC-7100
are directly wired.

CNJ 752 (ENERGY SELECTOR)
[illegible] 10 114P

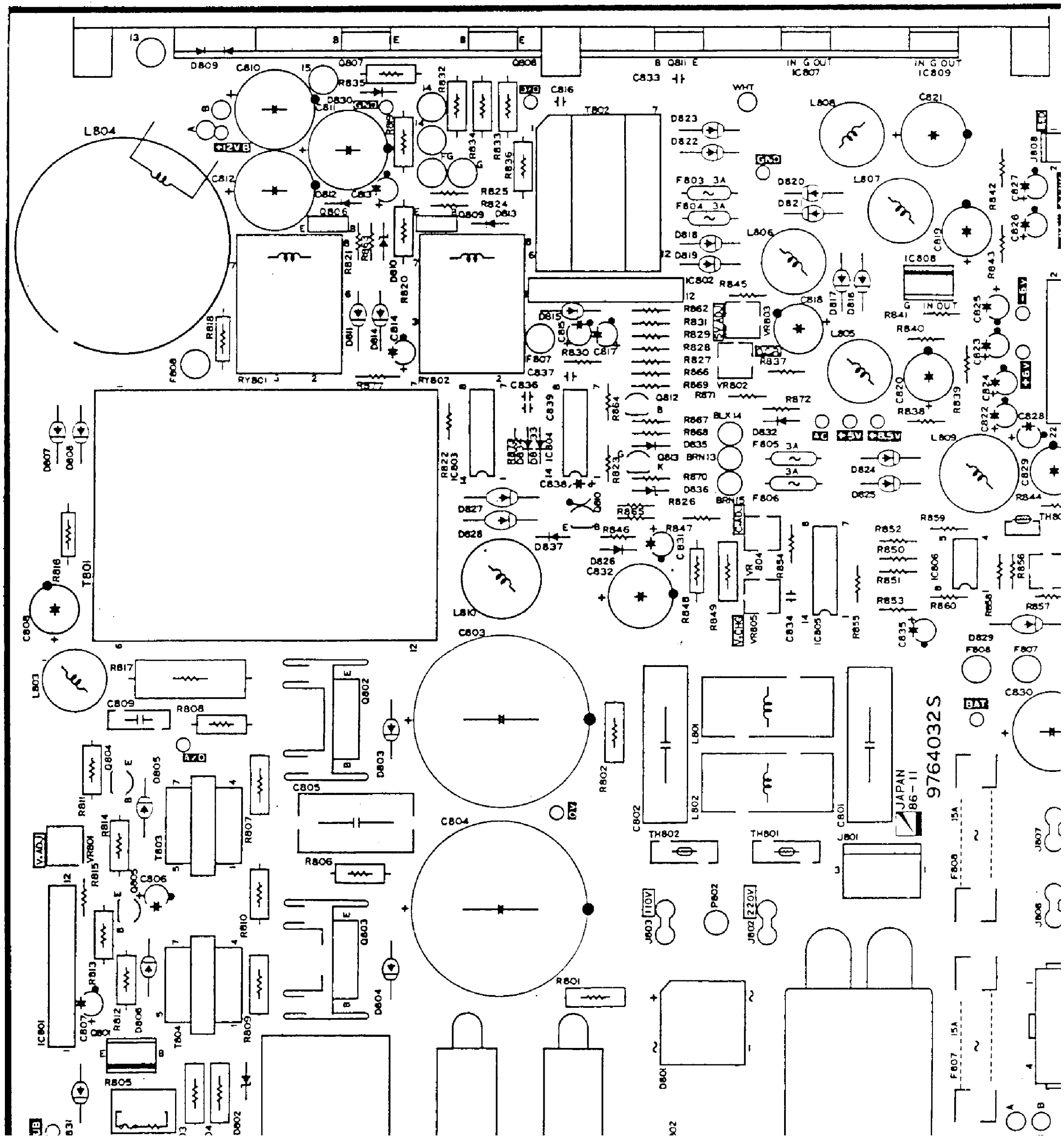
E SEL 0	1	2	E SEL 1
E SEL 2	3	4	E SEL 3
ED	5	6	POWER ON

△×				承認 APPD		DWG NO	104713
△×				検図 2 CHK 2		MODEL	TEC-7100 TEC-7200
△×				検図 1 CHK 1	小林		
△×				設計 DESIGN	小林	NAME	CONNECTOR PIN ASSIGN-MENT (3/3)
△×				写図 TRACE	石井		
変更 REVIS	理由 REASON	年月日 DATE	検図 CHK				

ECG / CPU BD
UP-76351
UP-7635

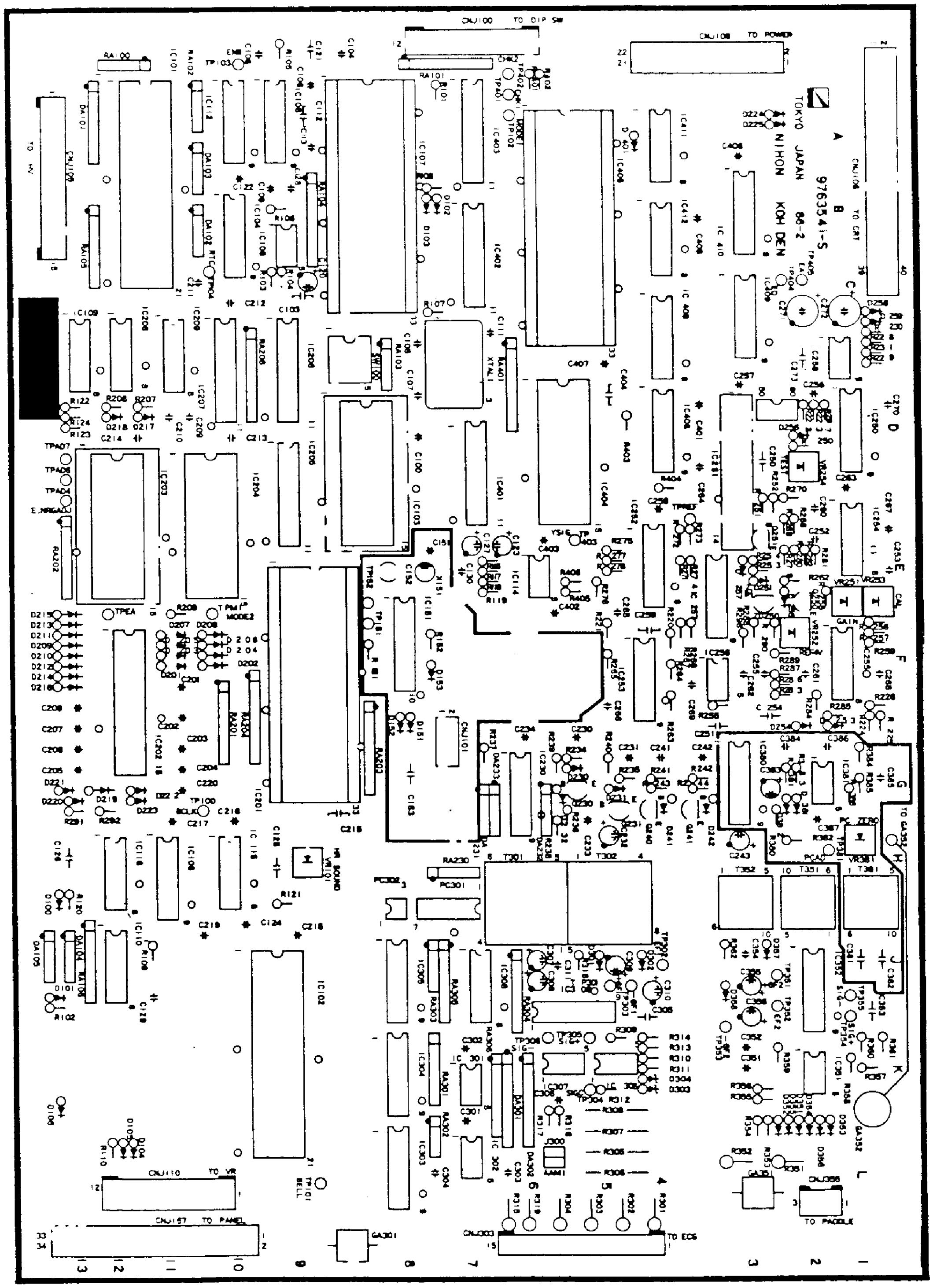


SW REGULATOR
UP-7640



D809
C810
Q807
R835
D830
C811
R832
R834
R833
R836
Q806
C816
C833
B Q811 E
WHT
IN G OUT
IC807
IC809
L804
+12V B
C812
D812
C813
Q806
R825
R824
Q809
D813
T802
D823
D822
F803 3A
F804 3A
D820
D821
D818
D819
L808
C821
L807
L806
L805
L809
J808
C827
C826
C819
R842
R843
IC808
G IN OUT
R841
IC802
R845
C818
VR803
5V ADJ
D817
D816
D815
C815
C817
R830
R862
R831
R829
R828
R827
R866
R869
R837
VR802
R871
R872
R840
C825
C823
C824
C822
C828
C829
C820
R838
R839
R844
RY801
RY802
R821
D810
R820
D811
D814
C814
R818
F808
T801
C836
C837
C839
IC803
IC804
R822
D833
D834
R873
C838
Q812
R864
R867
R868
D835
BLK 14
BRN 13
BRN 15
Q813
R870
D836
R823
D832
F805
F806
3A
D824
D825
R826
D827
D828
D837
R846
R847
D826
C832
C831
R848
R849
VR804
VR805
V.ADJ
R854
C834
IC805
R855
R852
R850
R851
R853
R859
IC806
R860
R856
R858
R857
TH801
TH802
C835
D829
F808
F807
C830
BAT
D807
D808
R816
C808
L810
L803
R817
C809
R808
C803
Q802
D803
R802
Q804
Q805
R811
R814
VR801
R815
T803
R807
C805
C804
6V
R806
C806
R810
Q803
D804
R801
C802
L801
L802
C801
JAPAN
86-11
97640032S
J801
J803
110V
P802
J802
220V
15A
J807
J806
IC801
R813
R812
D806
C807
Q801
T804
R809
R805
D802
D801

ECG / CPU BD
JP-76351
JP-7635


CNJ100 TO DIP SW
CNJ108 TO POWER
CNJ109 TO CRT
TO VR
TOKYO JAPAN
NIHON KOH DEN
9763541-S
86-2
A
B
C
D
E
F
G
H
J
K
L
CNJ110 TO VR
CNJ157 TO PANEL
CNJ303 TO ECG
GA301
TO PADDLE
BELL
HR SOUND
GAIN
CAL
ZERO
XTAL
13
12
11
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9
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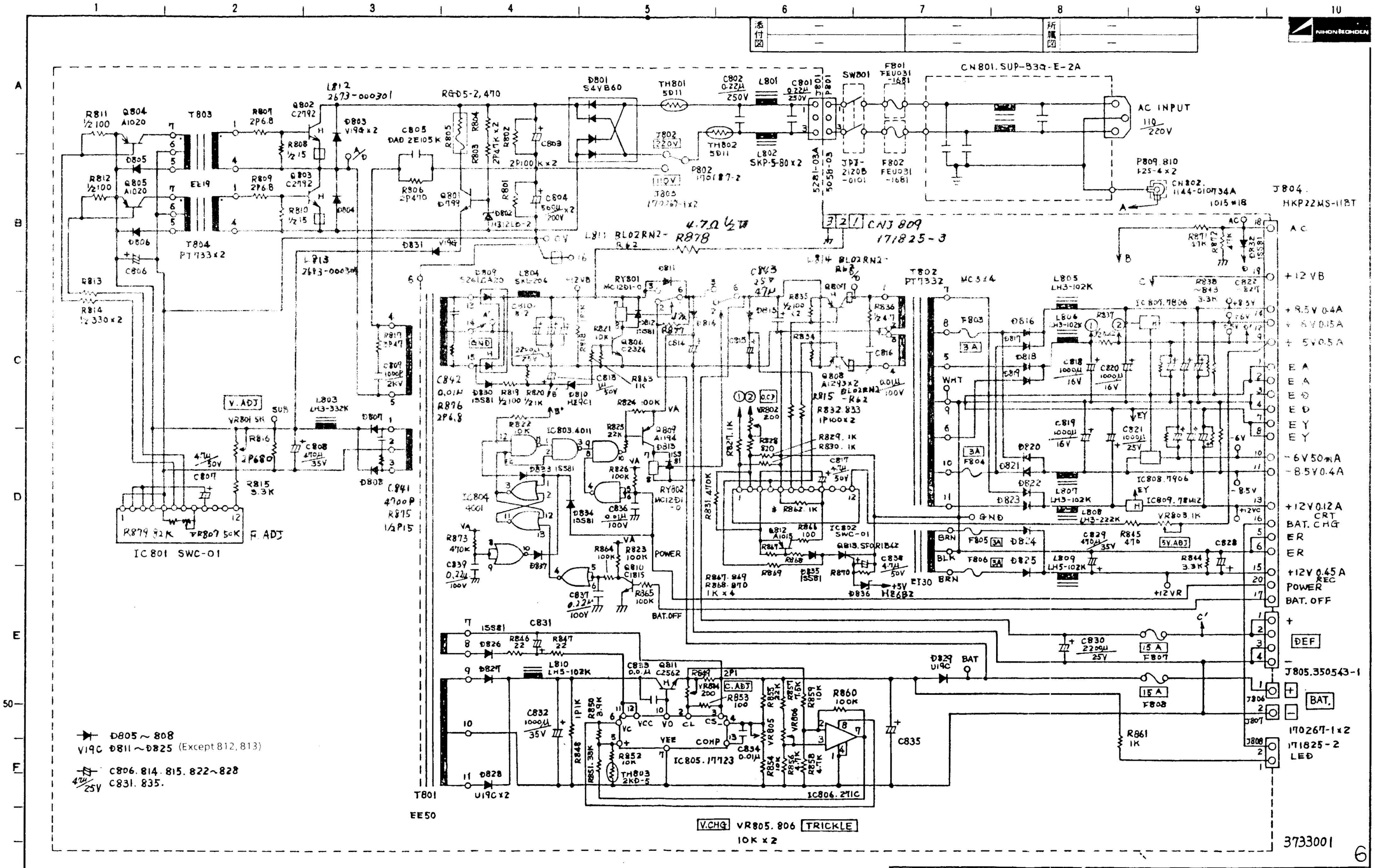
1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A
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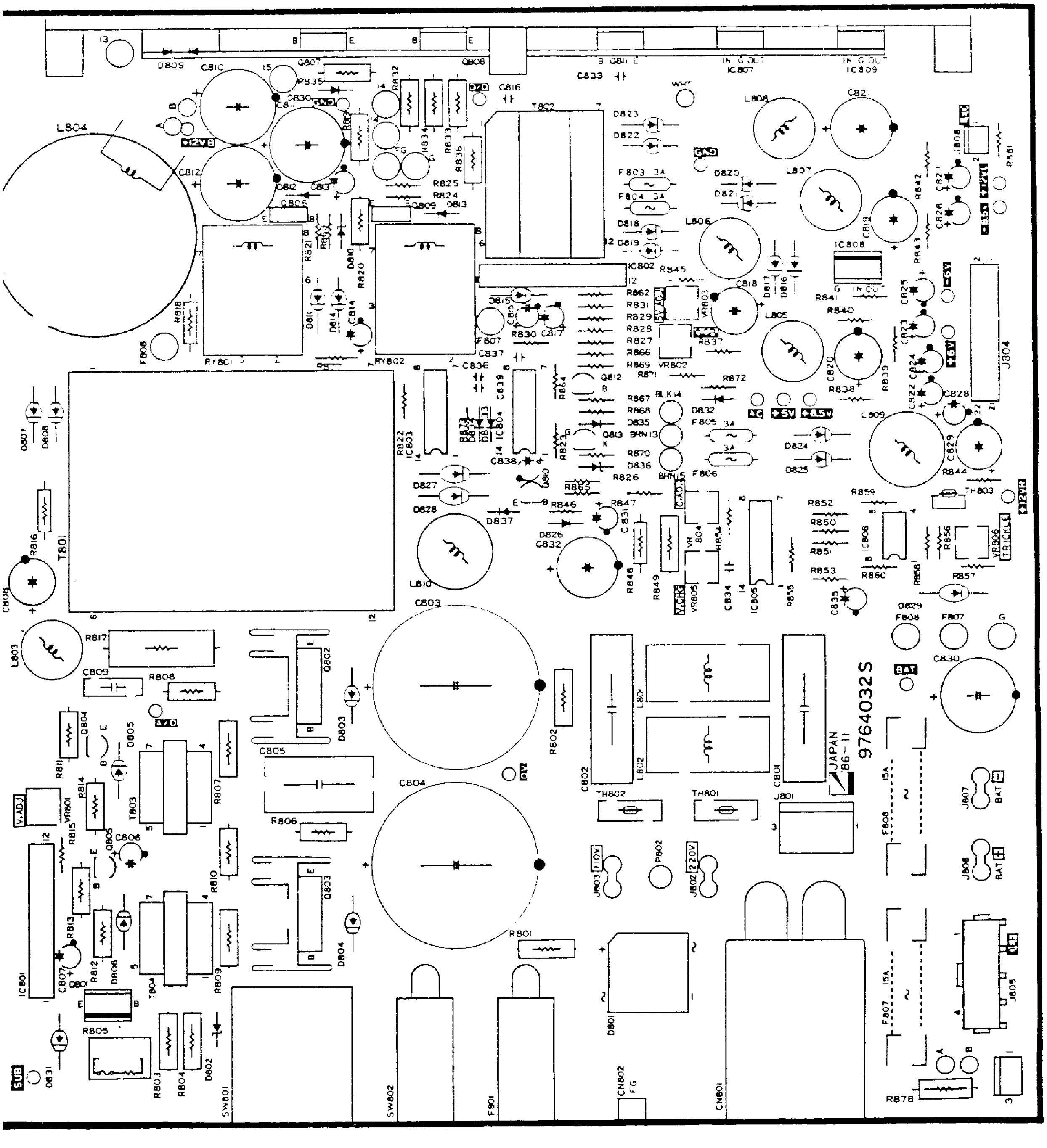
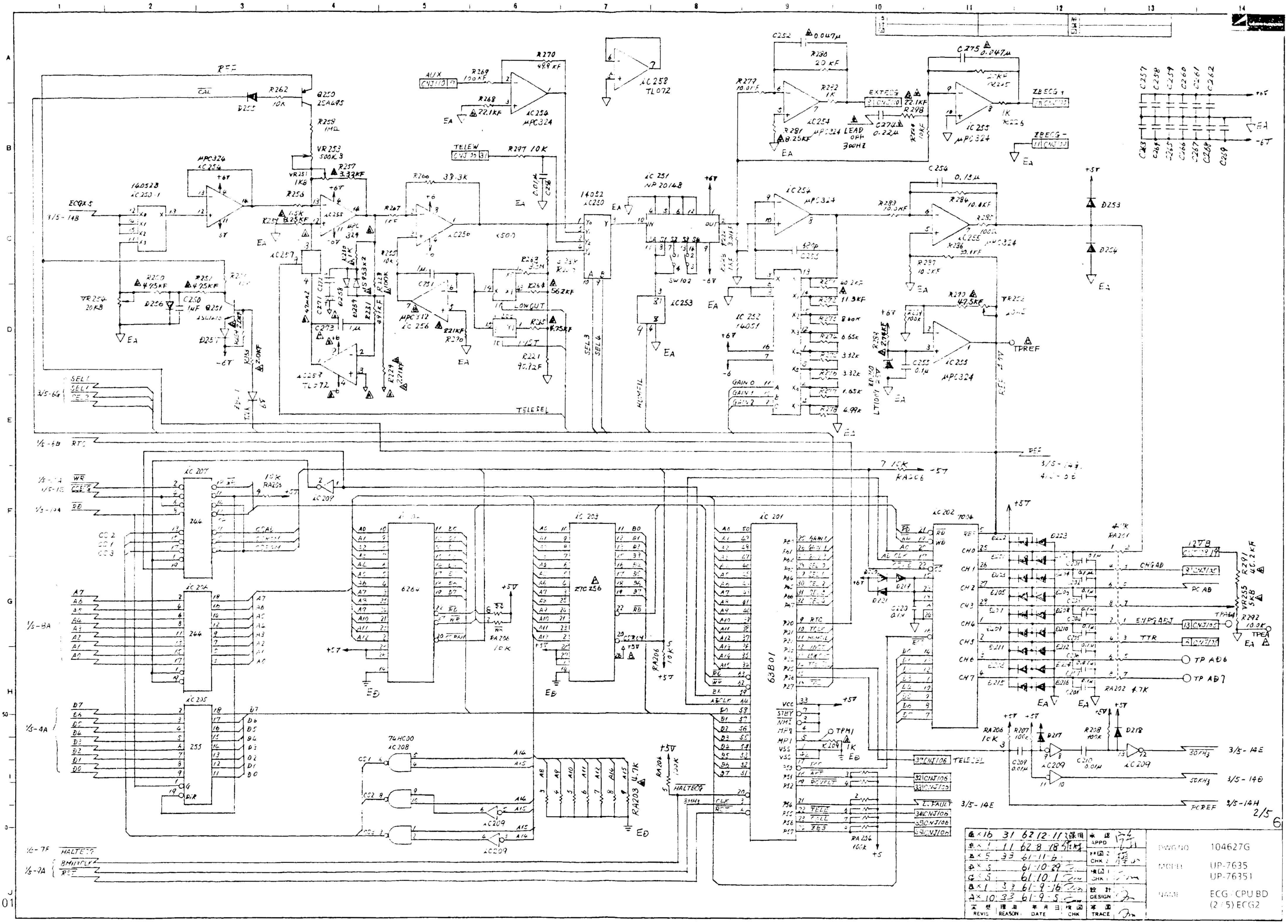
50
添付図
所属図
NIHON KOHDEN
AC INPUT
110/220V
CN801. SUP-B39-E-2A
SW801
F801 FEU031-1681
F802 FEU031-1681
D801 S4VB60
TH801 5D11
TH802 5D11
L801
L802 SKP-5-80×2
C802 0.22µ 250V
C801 0.22µ 250V
J802 220V
J803 110V
P802
P809.810
CN802
J804 HKP22MS-11BT
CNJ809 171825-3
R878 4.7Ω ½W
L811 BL02RN2-R62
L812 2673-000301
L813 2673-000301
Q802 C2792
Q803 C2792
Q804 A1020
Q805 A1020
T803 EE19
T804 PT733×2
R811 ½100
R812 ½100
R813
R814 ½330×2
C806
D806
D803 V19G×2
C805 DAO 2E105K
R806 2P470
Q801 D799
D802 H312LD-2
C803
C804 560µ×2 200V
R801
R802
R803
R804
R805
RGD5-2, 470
2P100 K×2
D831 V19G
V.ADJ
VR801 5K
R816 2P680
R815 3.3K
C807 47µ 50V
IC801 SWC-01
R879 82K
VR807 50K
F.ADJ
L803 LH3-332K
C808 470µ 35V
D807
D808
C841 4700P
R875 ½P15
C809 1000P 2KV
R817 2P47
C842 0.01µ
R876 2P6.8
D809 S2G1CA20
L804 SKL-204
RY801 MC12D1-0
Q806 C2324
R821 10K
C810
C811
C812
C813
C814
C815
D810 HZ9C1
R819 ½100
R820 ½1K
R863 1K
R824 100K
IC803 4011
R822 10K
R825 22K
Q807 A1194
D813 1S3
RY802 MC12D1-0
D833 1S581
D834 1S581
C836 0.01µ 100V
IC804 4001
R873 470K
C839 0.22µ 100V
D837
R864 100K
R823 100K
Q810 C1815
C837 0.22µ 100V
R865 100K
POWER
BAT.OFF
T802 PT7332
MC534
Q809 A1243×2
Q808
R835 ½100 ×2
R836 ½47
R834
C816
C843 25V 47µ
L814 BL02RN2-R62
R815 BL02RN2-R62
C834 0.01µ 100V
OCP
VR802 200
R828 820
R827 1K
R829 1K
R830 1K
R831 470K
R832.833 1P100×2
C817 47µ 50V
R862 1K
IC802 SWC-01
Q812 A1015
R866 100
Q813 SF0R1B42
R869
R868
D835 1S581
R870
C838 47µ 50V
D836 HZ6B2
R867-869 R868-870 1K×4
+5V
ET30
F803 3A
F804 3A
F805 3A
F806 3A
D816
D817
D818
D819
D820
D821
D822
D823
D824
D825
L805 LH3-102K
L806 LH3-102K
L807 LH3-102K
L808 LH3-222K
L809 LH5-102K
C818 1000µ 16V
C819 1000µ 16V
C820 1000µ 16V
C821 1000µ 25V
IC807 7806
IC808 7906
IC809 78M12
R837
R838~843 3.3K
C822 82T
R871 47K
R872 4.7K
D832 1S581
C829 470µ 35V
R845 470
5V.ADJ
VR803 1K
C828
R844 3.3K
+12VR
GND
WHT
BRN
BLK
AC
+12VB
+8.5V 0.4A
+6V 0.15A
+5V 0.5A
EA
ED
EY
-6V 50mA
-8.5V 0.4A
+12V 0.12A
BAT. CHG
CRT
ER
+12V 0.45A
REC
POWER
BAT. OFF
DEF
J805. 350543-1
BAT.
J806
J807
J808
170267-1×2
171825-2
LED
C830 2200µ 25V
F807 15A
F808 15A
D829 V19C
BAT
R861 1K
C831
D826
D827
D828 V19C×2
R846 22
R847 22
L810 LH5-102K
C832 1000µ 35V
R848
R849 1P1K
R850 8.9K
R851 33K
R852 10K
TH803 2KD-5
C833 0.01µ
Q811 C2562
2P1
C.ADJ
VR804 200
R853 100
IC805 17723
C834 0.01µ
R855 22K
R857 15K
R859 10K
VR805
VR806
R854 10K
R856 4.7K
R858 4.7K
R860 100K
C835
IC806 271C
T801 EE50
V.CHG
VR805. 806 10K×2
TRICKLE
D805~808 V19C
D811~D825 (Except 812, 813)
C806. 814. 815. 822~828 C831. 835. 47µ 25V
3733001
6

△×		- -		承認 APPD		DWG NO	105301A
△×		- -		検図2 CHK 2	下井		
△×		- -				MODEL	UP-7720
△×		- -		検図1 CHK 1	工藤		
△×		- -				NAME	SW REGULATOR
△×		- -		設計 DESIGN	浜中		
▲×4	11	61-12-16	工藤				
変更 REVIS	理由 REASON	年月日 DATE	検図 CHK	写図 TRACE	西川		

SW REGULATOR
UP-7640





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A
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C
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I
J
REF
CAL
D255
R262 10K
Q250 2SA495
R258 1MΩ
VR253 500K B
VR251 1KB
R257 3.32KF
R256
MPC324
IC254
14052B
IC250-1
ECGX5
3/5-14B
IC255
MPC324
IC257
R267 1KF
R266 38.3K
IC256
X500
AUX
R269 100KF
R268 22.1KF
R270 499KF
IC254 MPC324
IC258 TL072
TELEW
R297 10K
14052 IC250
IC251 NP2014B
SW102
IC253
IC252 14051
GAIN0
GAIN1
GAIN2
HUMFIL
SEL3
SEL4
TELESEL
C252 0.047µ
R280 20KF
R277 10.0KF
R282 1K
R281 8.25KF
EXTECG
C274 0.22µ
R298 22.1KF
LEAD OFF 300HZ
C275 0.047µ
IC255 MPC324
ZBECG+
ZBECG−
C256 0.15µ
R283 10.0KF
R284 10.0KF
R285 100K
R287 10.0KF
R286 22.1KF
R273 47.5KF
VR256 20KB
TPREF
IC255 MPC324
D253
D254
+5V
C257 C258 C259 C260 C261 C262
C263 C264 C265 C266 C267 C268 C269
+6V
−6V
EA
ED
VR254 20KB
R250 4.95KF
R251 4.95KF
C250 1NF
D256
Q251 2SC1815
D257
SEL1
SEL2
SEL3
3/5-6A
1/5-6B RTC
WR
CSECG
RD
IC207
244
10K RA205
IC209
CSCAL
CSCOM
CS2
CS1
CS3
IC206
IC205
255
A7 A6 A5 A4 A3 A2 A1 A0
1/5-8A
D7 D6 D5 D4 D3 D2 D1 D0
1/5-4A
6264
IC203
27C256
RA206 10K
IC201
63B01
+5V
TPM1
1K
74HC00
IC208
CS1
CS2
CS3
RA203 4.7K
HALTECG
8MHz
1/5-7F
1/5-7A
HALTECG
8MHz CLK
RST
REF
3/5-14J
4/5-3B
RA206
IC202
7004
CH0 CH1 CH2 CH3 CH4 CH5 CH6 CH7
D223
RA201 4.7K
CHGAD
PCAD
EMPGADJ
TTR
TPAD6
TPAD7
RA202 4.7K
R291 10.2KF
VR255 5KB
R292 10.0KF
TPEA
RA206 10K
R207 100K
D217
R208 100K
D218
IC209
50KHz
3/5-14E
3/5-14G
PCREF
3/5-14H
TELESEL
E.FAULT
3/5-14E
RA236 100K
2/5
6

REVIS	REASON	DATE	CHK
16	31	62.12.11	久保田
1	11	62.8.18	須材
5	33	61.11.6	
5		61.10.29	
5		61.10.1	
1	33	61.9.16	
10	33	61.9.5	

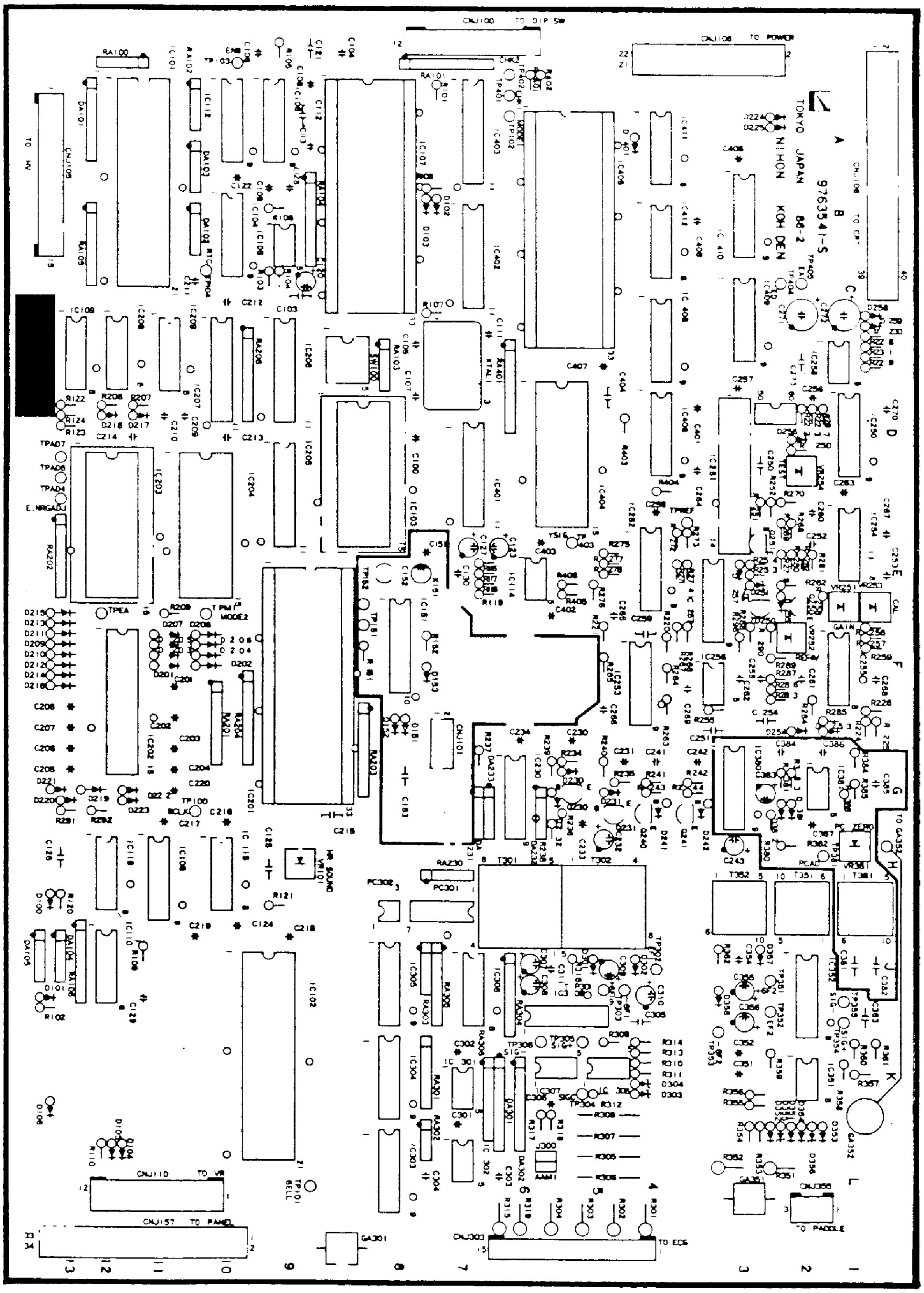
承認 APPD
検図 2 CHK 2
検図 1 CHK 1
設計 DESIGN
写図 TRACE

DWG NO 104627G

MODEL UP-7635
UP-76351

NAME ECG / CPU BD
(2 / 5) ECG2

ECG / CPU BD
JP-76351
JP-7635


CNJ100 TO DIP SW
CNJ108 TO POWER
CNJ106 TO CRT
CNJ105 TO HV
TOKYO JAPAN
NIHON KOHDEN
9763541-S
86-2
CNJ110 TO VR
CNJ157 TO PANEL
CNJ303 TO ECG
TO PADDLE
13
12
11
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1
A
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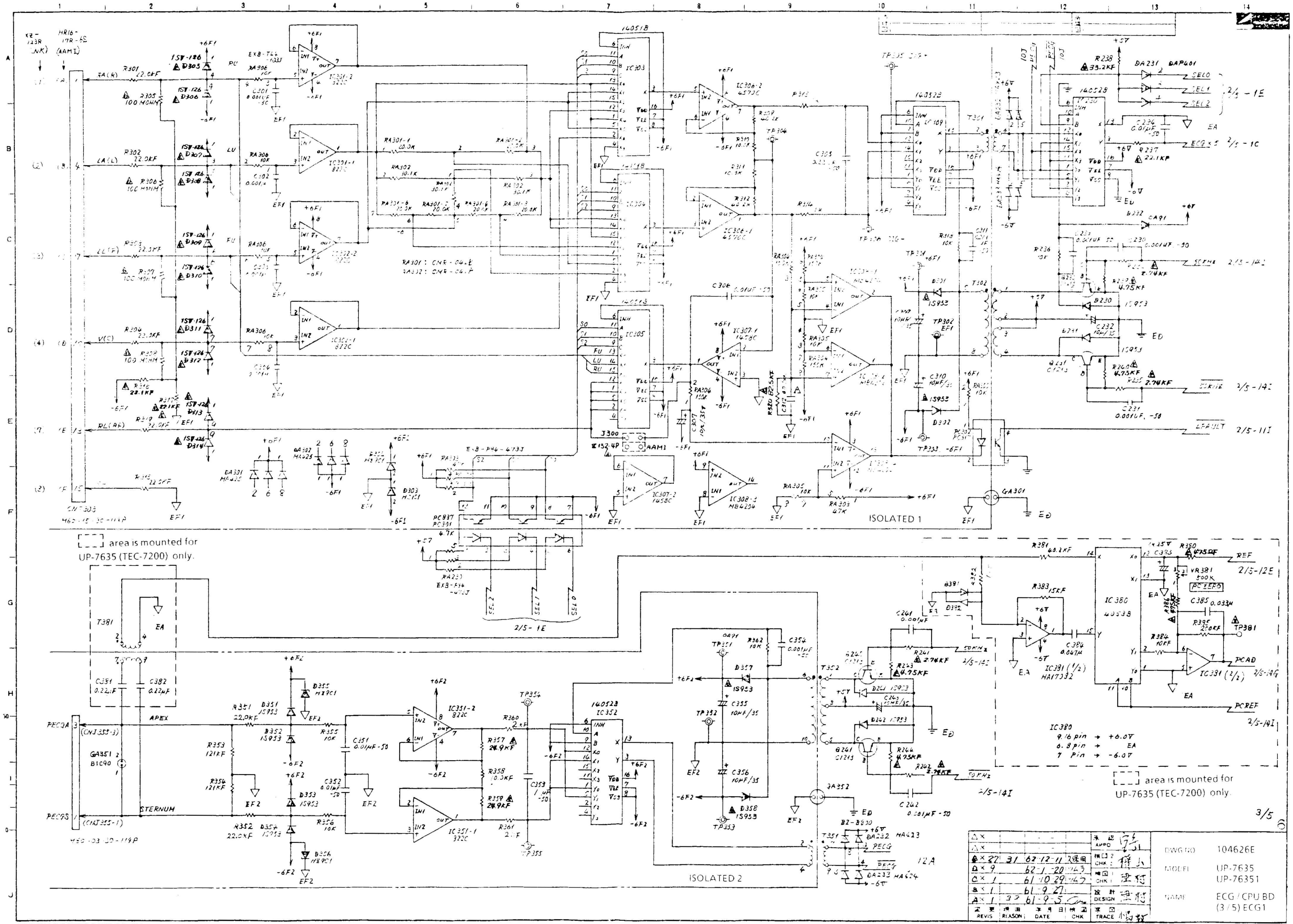
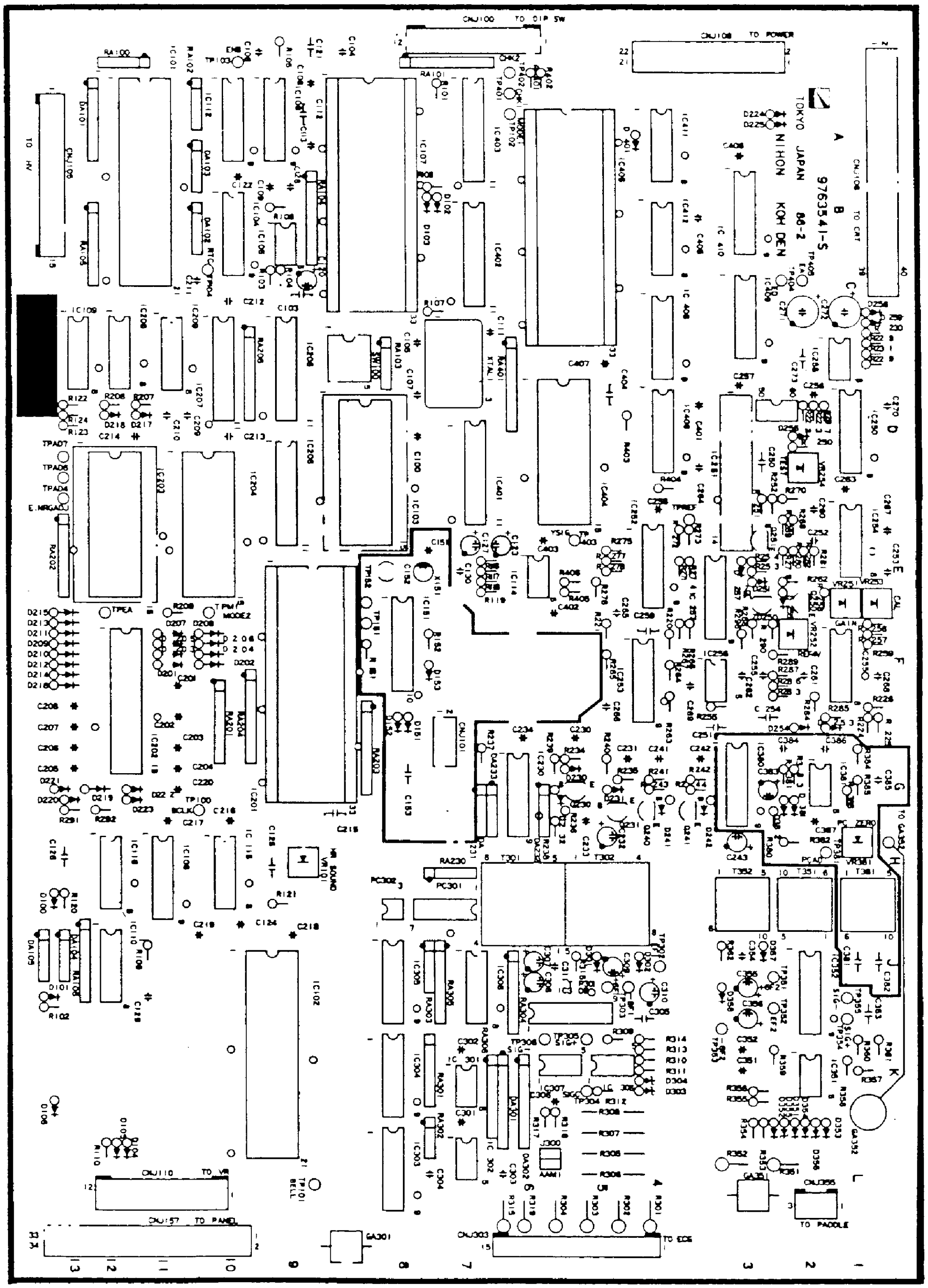
C
D
E
F
G
H
J
K
L


CN-303
RA(R)
LA(L)
LL(F)
V(C)
RL(RF)
R301 22.0KF
R302 22.0KF
R303 22.2KF
R304 22.0KF
D305
D306
D307
D308
D309
D310
D311
D312
D313
D314
IC301-2 822C
IC301-1 822C
IC302-2 822C
IC302-1 822C
14051B
IC303
IC304
IC305
IC306-2 4570C
IC306-1 4570C
IC307-1 1458C
IC307-2 1458C
IC308-1 MB4204
14052B
IC109
T301
T302
J300
AAM1
PC301
PC303
PC837
RA301 : CNR-04-E
RA302 : CNR-04-F
DA231 DAP401
SEL0
SEL1
SEL2
2/5-1E
2/5-1C
ECG×5
2/5-14I
2/5-11I
LEFAULT
GA301
ISOLATED 1
EA
ED
EF1
area is mounted for
UP-7635 (TEC-7200) only.
T381
C381 0.22μF
C382 0.22μF
PECGA
PECGS
APEX
STERNUM
GA351 B1C90
IC351-2 822C
IC351-1 822C
14052B
IC352
TP354
TP355
T352
ISOLATED 2
IC380 4053B
IC381 (1/2) HA17902
REF
2/5-12E
TP381
PCAD
2/5-14G
PCREF
2/5-14I
IC380
9, 16 pin → +6.0V
6, 8 pin → EA
7 pin → -6.0V
area is mounted for
UP-7635 (TEC-7200) only.
3/5
6
△×
△×
▲× 27 31 62-12-11 久保田
△× 9 62-1-20 ツムラ
△× 1 61-10-29 ツムラ
▲× 1 61-9-27
▲× 1 33 61-9-5
変更 REVIS
理由 REASON
年月日 DATE
検図 CHK
承認 APPO
検図 2 CHK 2
検図 1 CHK 1
設計 DESIGN
写図 TRACE
DWG NO 104626E
MODEL UP-7635 UP-76351
NAME ECG / CPU BD (3/5) ECG1

ECG / CPU BD
UP-76351
UP-7635


CNJ100 TO DIP SW
CNJ108 TO POWER
CNJ106 TO CRT
CNJ105 TO HV
CNJ110 TO VR
CNJ157 TO PANEL
CNJ303 TO ECG
CNJ355 TO PADDLE
TOKYO JAPAN
NIHON KOH DEN
9763541-S
86-2
A
B
C
D
E
F
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J
K
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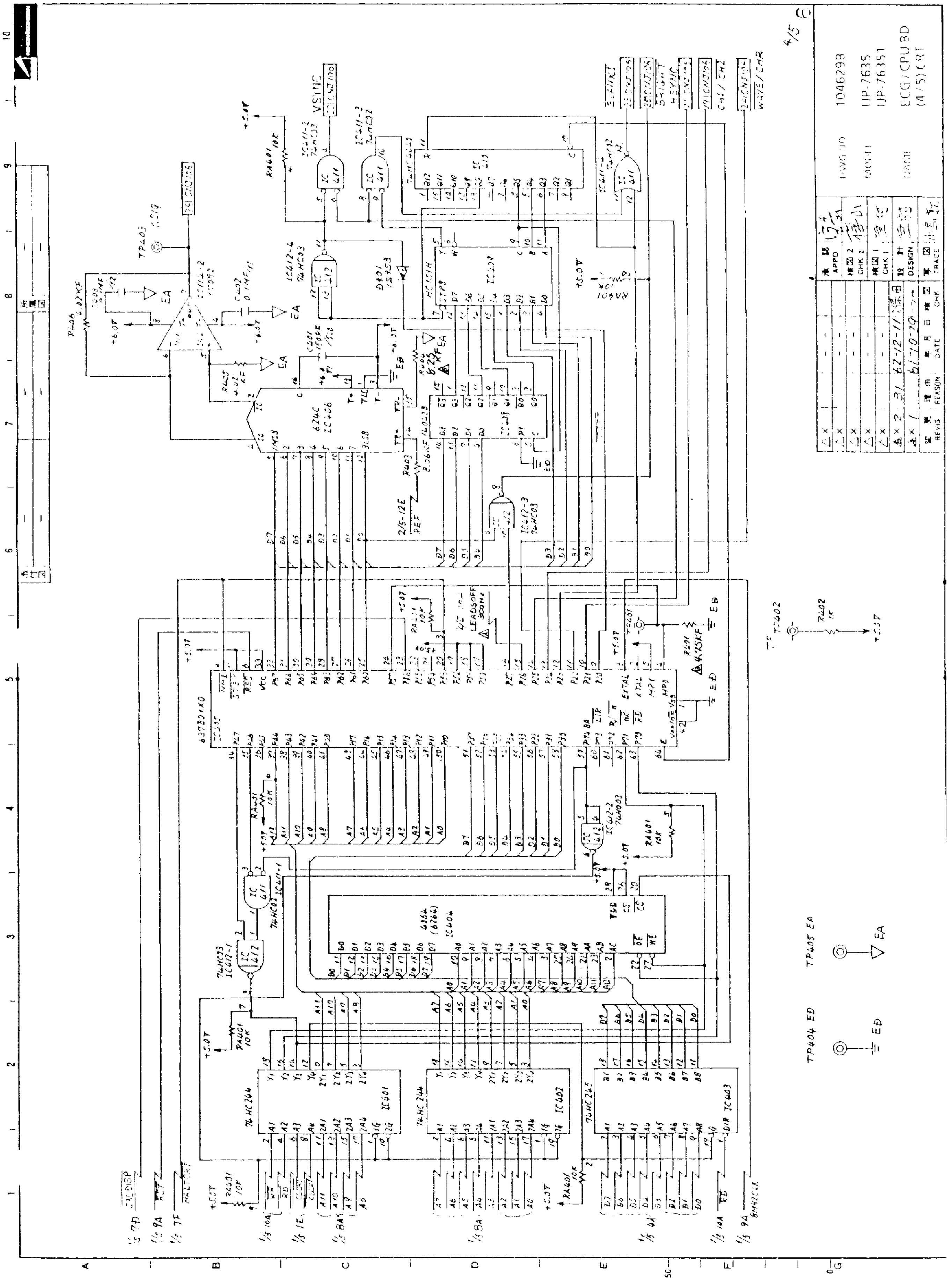
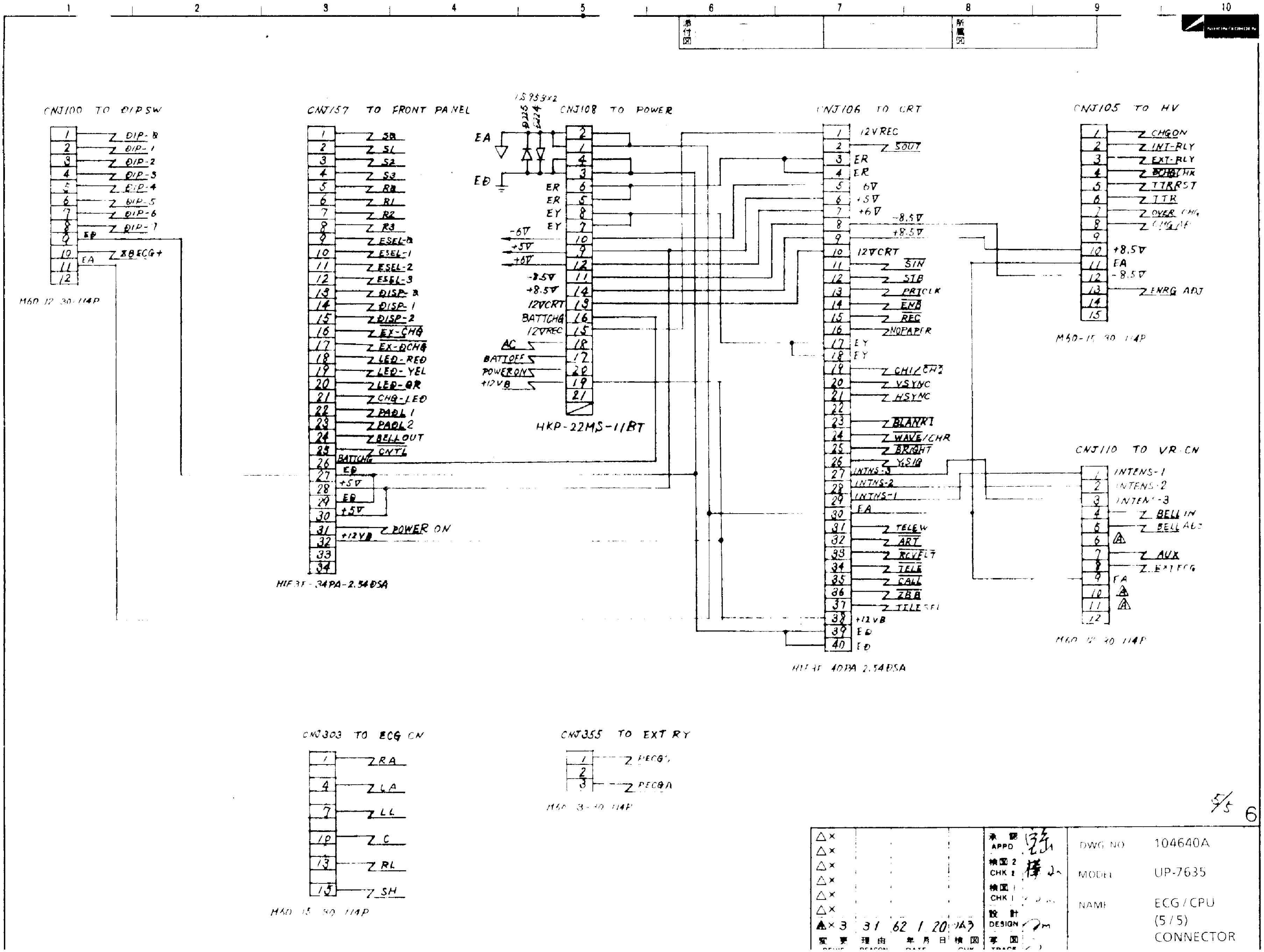

4/5
DWG NO 104629B
MODEL UP-7635
UP-76351
NAME ECG/CPU BD
(4/5) CRT
IC406
IC407
IC408
IC409
IC410
IC401 74HC244
IC402 74HC244
IC403 74HC245
IC404 6364 (6264)
63701XO
VSYNC
TP403
TP404 ED
TP405 EA
TP401
TP402
EA
ED


CNJ100 TO DIPSW
Z DIP-B
Z DIP-1
Z DIP-2
Z DIP-3
Z DIP-4
Z DIP-5
Z DIP-6
Z DIP-7
ED
EA
Z XBECG+
M60 12 30 114P
CNJ157 TO FRONT PANEL
Z SB
Z S1
Z S2
Z S3
Z RB
Z R1
Z R2
Z R3
Z ESEL-B
Z ESEL-1
Z ESEL-2
Z ESEL-3
Z DISP-B
Z DISP-1
Z DISP-2
Z EX-CHG
Z EX-DCHG
Z LED-RED
Z LED-YEL
Z LED-GR
Z CHG-LED
Z PADL 1
Z PADL 2
Z BELLOUT
Z CNTL
BATTCHG
ED
+5V
ED
+5V
+12VB
Z POWER ON
HIF3F-34PA-2.54DSA
1S953x2
EA
ED
CNJ108 TO POWER
ER
ER
EY
EY
-6V
+5V
+6V
-8.5V
+8.5V
12VCRT
BATTCHG
12VREC
AC
BATTOFF
POWERON
+12VB
HKP-22MS-11BT
CNJ106 TO CRT
12VREC
Z SOUT
ER
ER
6V
+5V
+6V
-8.5V
+8.5V
12VCRT
Z STN
Z STB
Z PRTCLK
Z ENB
Z REC
Z NOPAPER
EY
EY
Z CH1/CH2
Z VSYNC
Z HSYNC
Z BLANK1
Z WAVE/CHR
Z BRIGHT
Z YSIG
INTNS-3
INTNS-2
INTNS-1
EA
Z TELEW
Z ART
Z RCVFLT
Z TELE
Z CALL
Z ZBB
Z TELESEL
+12VB
ED
ED
HIF3F 40PA 2.54DSA
CNJ105 TO HV
Z CHGON
Z INT-RLY
Z EXT-RLY
Z ROBOTHK
Z TTRRST
Z TTR
Z OVER CHG
Z CHG AF
+8.5V
EA
-8.5V
Z ENRG ADJ
M60-15 30 114P
CNJ110 TO VR CN
INTENS-1
INTENS-2
INTENS-3
Z BELL IN
Z BELL ADJ
Z AUX
Z EXT ECG
EA
M60 12 30 114P
CNJ303 TO ECG CN
Z RA
Z LA
Z LL
Z C
Z RL
Z SH
M60 15 30 114P
CNJ355 TO EXT RY
Z RECG
Z RECGA
M60 3 30 114P
5/5
6
A
B
C
D
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F
G
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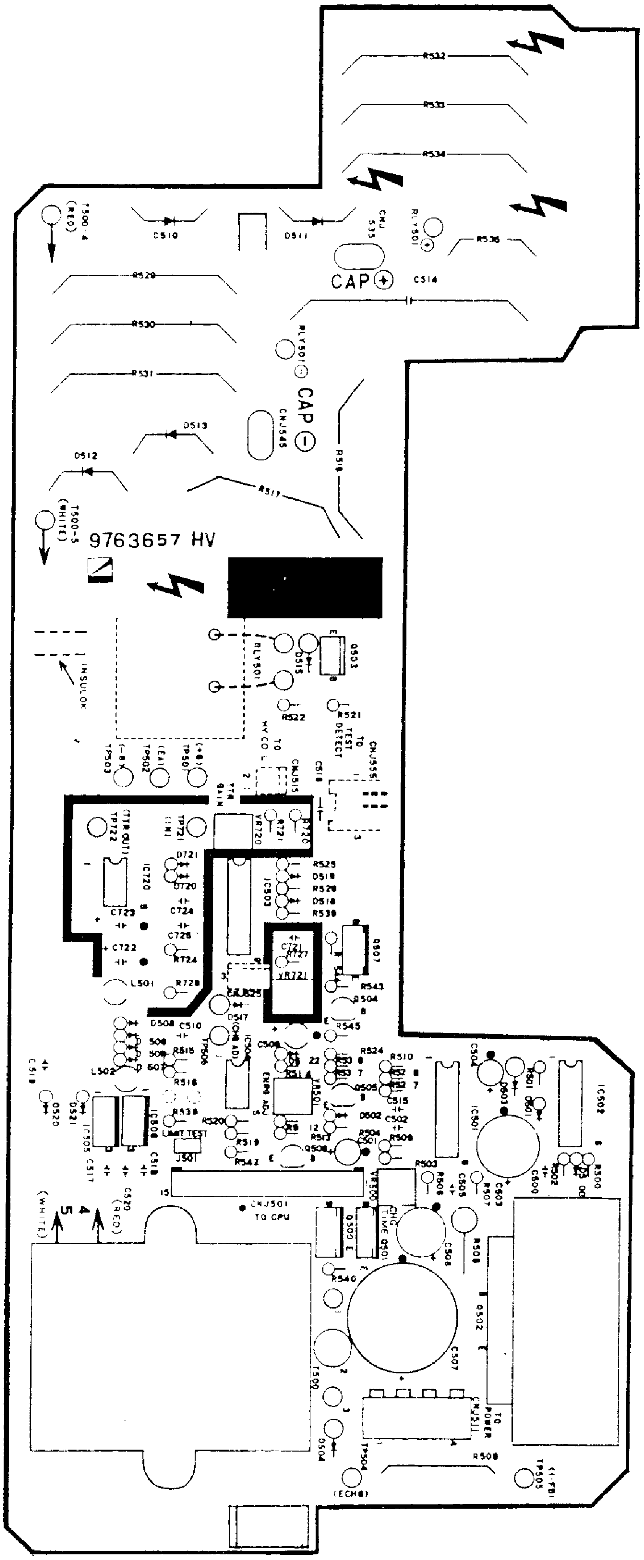
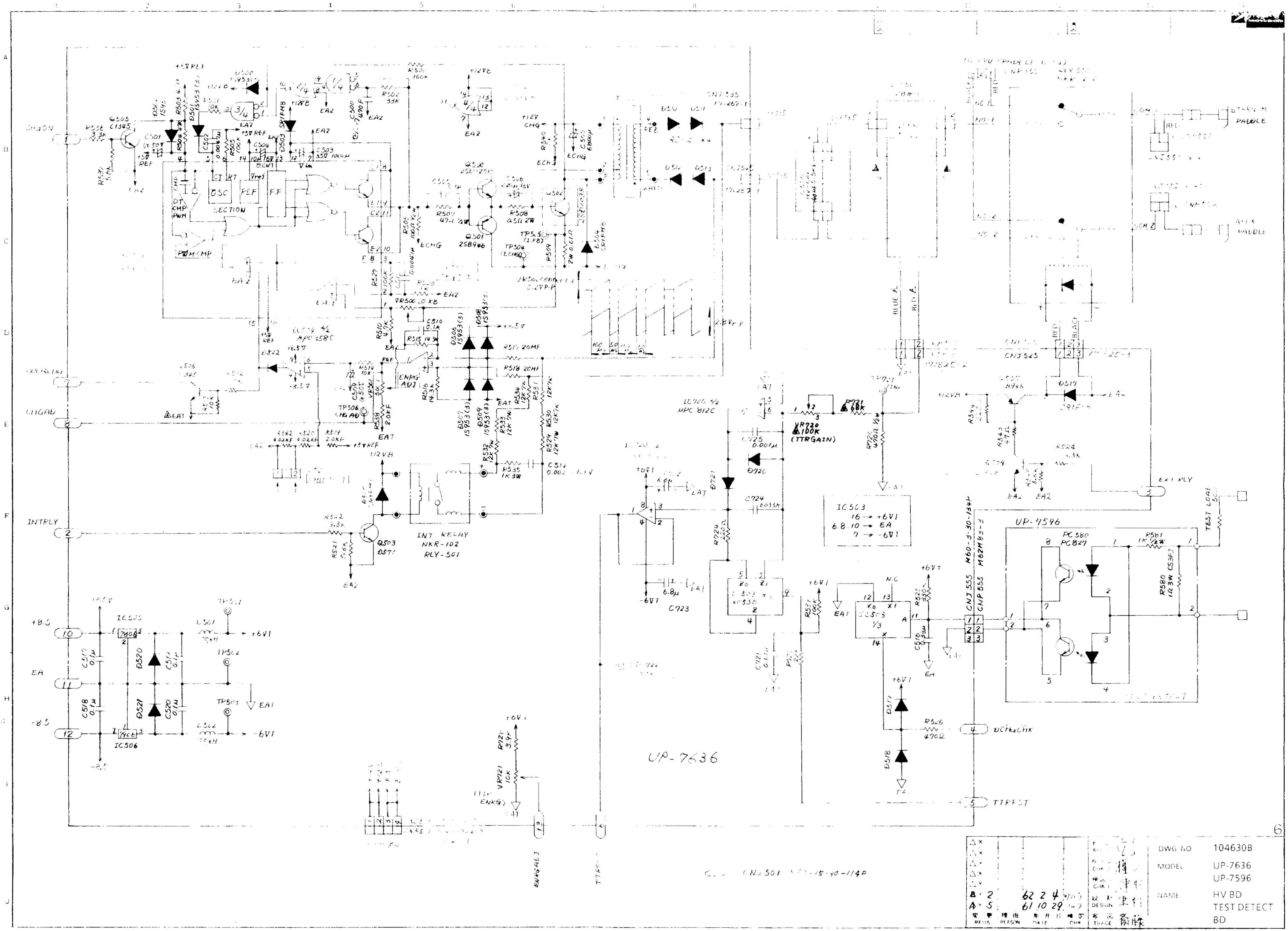
DWG NO	104640A
MODEL	UP-7635
NAME	ECG / CPU (5 / 5) CONNECTOR

△× 3 31 62 / 20

HIGH VOLTAGE BD
UP-7636



R532
R533
R534
R536
D510
D511
CNJ 535
RLY501 (+)
CAP (+)
C514
R529
R530
R531
RLY501 (-)
CAP (-)
CNJ545
D513
D512
R516
R517
T500-4 (RED)
T500-5 (WHITE)
9763657 HV
INSULOK
RLY501
D515
Q503
R522
R521
TO HV COIL
TO TEST DETECT
CNJ555
CNJ515
C516
TP503
TP502
TP501
TTR GAIN
TP722
TP721
VR720
IC720
D721
D720
R525
D518
R528
D514
R538
IC503
C723
C724
C722
C725
R724
C721
R727
VR721
Q507
L501
R728
R543
D504
R545
D508
C510
D517
TP506
C509
R524
R510
C504
IC501
IC502
L502
R515
R516
R514
Q505
C515
C502
D502
R504
R509
C501
R503
R506
C505
R507
C503
R502
C500
R500
R539
LIMIT TEST
R520
R519
R542
J501
Q508
D521
D520
C519
IC505
C517
IC508
C518
CNJ501 TO CPU
C520
(WHITE)
(RED)
5
4
Q500
Q501
CHG TIME
C506
R508
R540
Q502
C507
T500
CNJ511 TO POWER
R508
TP504 (ECHB)
TP505 (+FB)

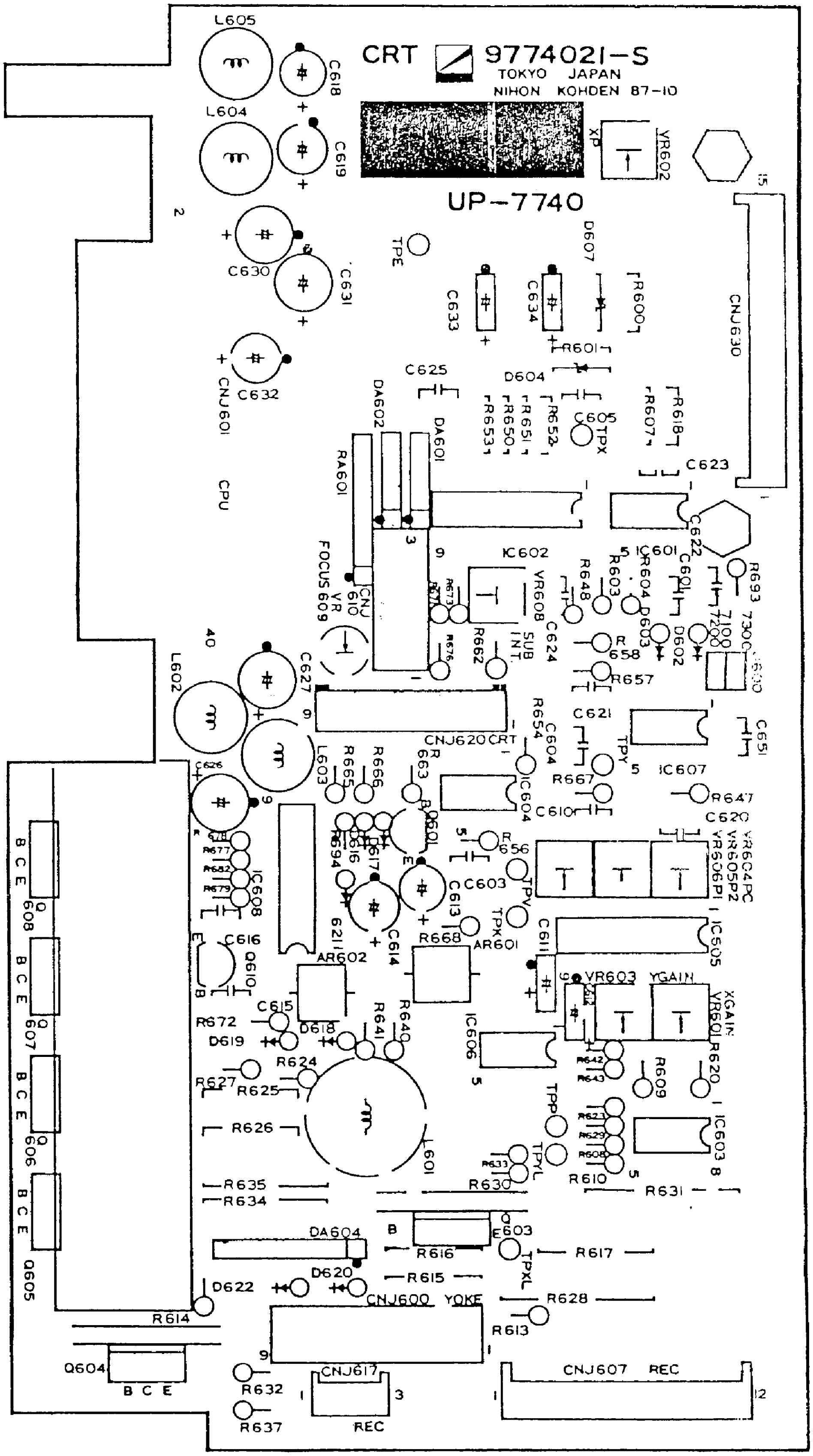

CHGON
R536 3.3K
R537 5.6K
Q505 C1345
C501 1μ 50V
+5V REF
EA2
D502 1S953
R503 4.7K
R504 1.2K
D501 1S953 (3)
+5V REF
D500 1S953(3)
+12VB
R501 10K
3/4
2/4
1/4
4/4
+12VB
SR1FM8
D503
C502 0.0047μ
R505 100K
C504 10μ 16V
C503 35V 100μ
C500 470P
R502 33K
R500 100K
+12VB
CT RT
OSC
REF
Vref
F.F
DT CMP PWM
SECTION
PWM CMP
C.CNT
Vin
E1 7
C1 8
C2 11
E2 10
F.B 3
R506 100Ω ½W
R507 47Ω ½W
Q500 2SD1271
Q501 2SB946
C506 220μ 16V
R508 0.5Ω 2W
Q502 2SD1038
ECHG
+12V CHG
R540
C507 6800μ
ECH
TP505 (I.FB)
TP504 (ECHG)
R509 2W 0.01Ω
D504 SR1FM8
VR500 center
0.2VP-P
R527 100K
C511 0.0047μ
R528 1K
VR500 20 KB
R510 4.7K
C510 0.1μ
R515 14.3K
IC504 ½ μPC358C
+5V REF
+8.5V
-8.5V
D522
R506 1.3K
ENRG ADJ
R514 10K
C509 1μ 50V
VR501 50K
TP506 CHG AD
R538 2.0KF
R516 14.3K
D506 1S953(3)
D508 1S953(3)
D507 1S953(3)
D509 1S953(3)
R517 20MF
R518 20MF
R534 12K 7W
R531 12K 7W
R533 12K 7W
R530 12K 7W
R529 12K 7W
R532 12K 7W
R535 1K 3W
C514 0.002
R582 4.02KF
R520 4.02KF
R519 2.0KF
+5V REF
OVERCHG
CHGAD
EAT
+12VB
Q503 D571
R522 3.3K
R521 5.6K
INT RELAY
NKR-102
RLY-501
INTRLY
+8.5
EA
-8.5
IC505
7806
7906
IC506
C517 0.1μ
C518 0.1μ
D520
D521
C519 0.1μ
C520 0.1μ
L501
L502
TP501
TP502
TP503
+6VI
-6VI
EAT
+8.5V
-8.5V
100 μS
50 μS
2.8VP-P
T
D510
D511
D512
D513
RED
WHITE
×4
CNJ 535
CNJ 545
BLUE
RED
CNJ 525
BLACK
D517 SR1FM8
+12VR
Q537 B946
R544 220Ω
R543 47Ω
R524 3.3K
EA2
EXT RLY
TO CPU PADDLE
CNP 555
RLY 551
NC 1
NO 1
NC 2
NO 2
COM 1
COM 2
STERNUM PADDLE
APEX PADDLE
IC720 ½ μPC812C
VR720 100K (TTRGAIN)
R721 68K
R726 470Ω ½W
TP721 (IN)
C725 0.001μ
D720
D721
C724 0.033μ
R724 220Ω
+6VI
-6VI
C722 6.8μ
C723 6.8μ
IC503
16 → +6VI
6.8.10 → EA
7 → -6VI
IC502 MC14538
R531 100K
R523 22K
C721 0.01μ
IC503 ⅓
X0 X1
N.C
R525 330Ω
C516 0.33μ
D514
D518
R526 470Ω
DCHGCHK
TTREST
CNJ 555 M60-5-30-134P
CNP 555 M62M83-3
UP-7596
PC580 PC827
R581 1K ½W
R580 1Ω 3W C53PJ
TEST LOAD
UP-7636
R722 3.9K
VR721 10K
(TTR ENRG)
ENRGADJ
TTR
CNJ 501 M60-15-30-114P
6

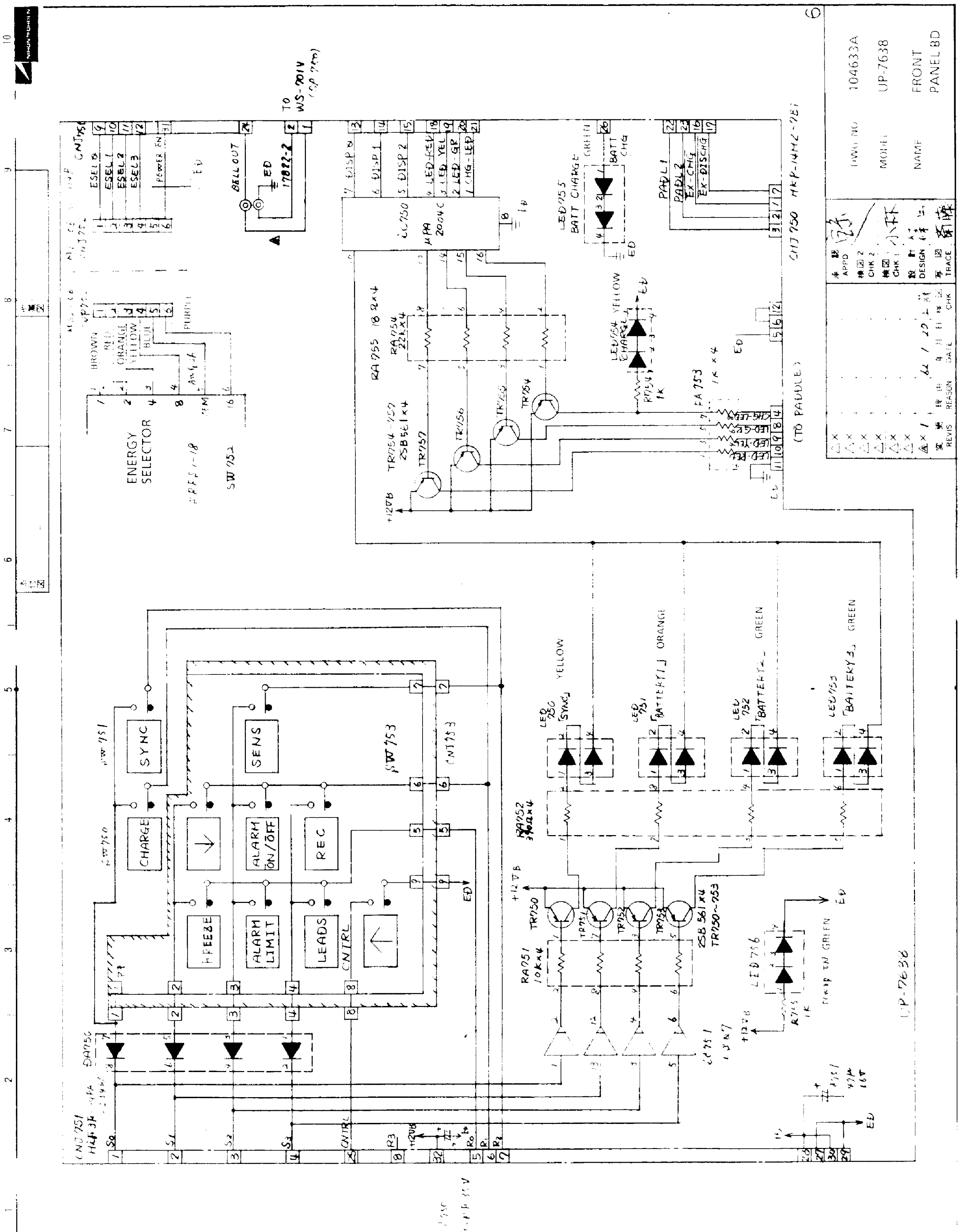
△×					
△×					
△×					
△×					
△×					
B × 2		62 2 4			
A × 5		61 10 29			
変更 REVIS	理由 REASON	年月日 DATE	検図 CHK		

APP:
CHK:
CHK:
設計 DESIGN:
写図 TRACE: 斎藤

DWG NO 104630B
MODEL UP-7636
UP-7596
NAME HV BD
TEST DETECT
BD

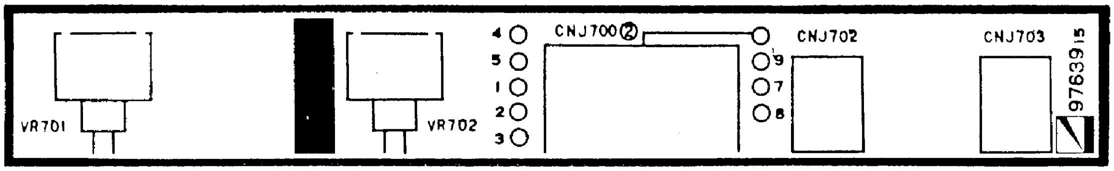
CRT DRIVER BD
UP-7740


CRT
9774021-S
TOKYO JAPAN
NIHON KOHDEN 87-10
UP-7740
L605
L604
C618
C619
C630
C631
C632
CNJ601
CPU
TPE
C633
C634
D607
R600
R601
D604
C625
DA602
DA601
RA601
R653
R650
R651
R652
C605
TPX
R607
R618
C623
CNJ630
VR602
XP
IC602
VR608
SUB INT
C624
IC601
R648
R603
R604
D603
C601
D602
C622
R693
7100
7200
7300
CNJ610
FOCUS VR609
L602
C627
L603
CNJ620 CRT
R654
C604
R658
R657
C621
TPY
C651
IC607
R647
R665
R666
R663
R667
C610
C620
IC604
Q601
R656
VR604PC
VR605P2
VR606P1
C626
IC608
R694
D616
D617
C613
C603
TPV
TPX
AR601
C611
IC505
C614
R668
C616
Q610
AR602
VR603
YGAIN
XGAIN
VR601
C615
R672
D619
D618
R641
R640
IC606
R642
R643
R609
R620
R624
R627
R625
TPP
R626
L601
R623
R629
R608
IC603
R610
R633
TPYL
R635
R634
R630
R631
Q603
DA604
R616
R617
TPXL
R615
D620
D622
CNJ600 YOKE
R628
R614
R613
Q604
Q605
Q606
Q607
Q608
B C E
R632
CNJ617
REC
R637
CNJ607 REC



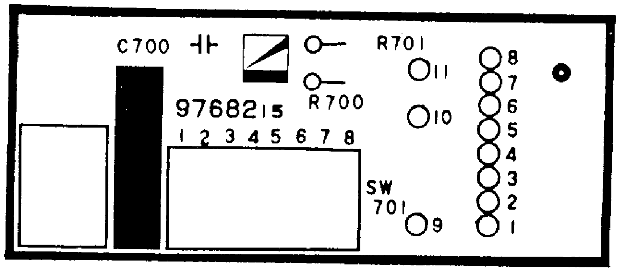
DWG NO 104633A
MODEL UP-7638
NAME FRONT PANEL BD
APPD
CHK 2
CHK 1
DESIGN
TRACE
REVIS
REASON
DATE
CHK
62 / 12 / 21
TO WS-701V
BELL OUT
ED
17822-2
CNJ752
ESEL 0
ESEL 1
ESEL 2
ESEL 3
POWER ON
DISP 0
DISP 1
DISP 2
LED-RED
LED YEL
LED GR
CHG-LED
IC750
μPA 2004C
LED755
BATT CHARGE
GREEN
BATT CHG
PADL1
PADL2
EX-CHG
EX-DISCHG
CNJ750
HKP-14HL-7E1
RA755 10kx4
RA754 22kx4
TR754~757
2SB561x4
TR757
TR756
TR755
TR754
LED754 YELLOW CHARGE
R754 1k
RA753 1k x4
(TO PADDLE)
BROWN
RED
ORANGE
YELLOW
BLUE
PURPLE
ENERGY SELECTOR
SW751
SYNC
CHARGE
SW750
SENS
ALARM ON/OFF
REC
FREEZE
ALARM LIMIT
LEADS
CNTRL
SW753
CNJ753
ED
YELLOW
LED 750 SYNC
ORANGE
LED 751 BATTERY 1
GREEN
LED 752 BATTERY 2
GREEN
LED 753 BATTERY 3
RA752 390Ωx4
+12VB
TR750
TR751
TR752
TR753
2SB561x4
TR750~753
RA751 10kx4
IC751
LED756
R756 1k
+12VB
DA750
CNJ751
S0
S1
S2
S3
CNTRL
R3
+12VB
R0
R1
R2
C751
UP-7638
A
B
C
D
E
F
G
1
2
3
4
5
6
7
8
9
10

VR AND CONNECTOR BD
UP-76391
UP-76392
UP-76393

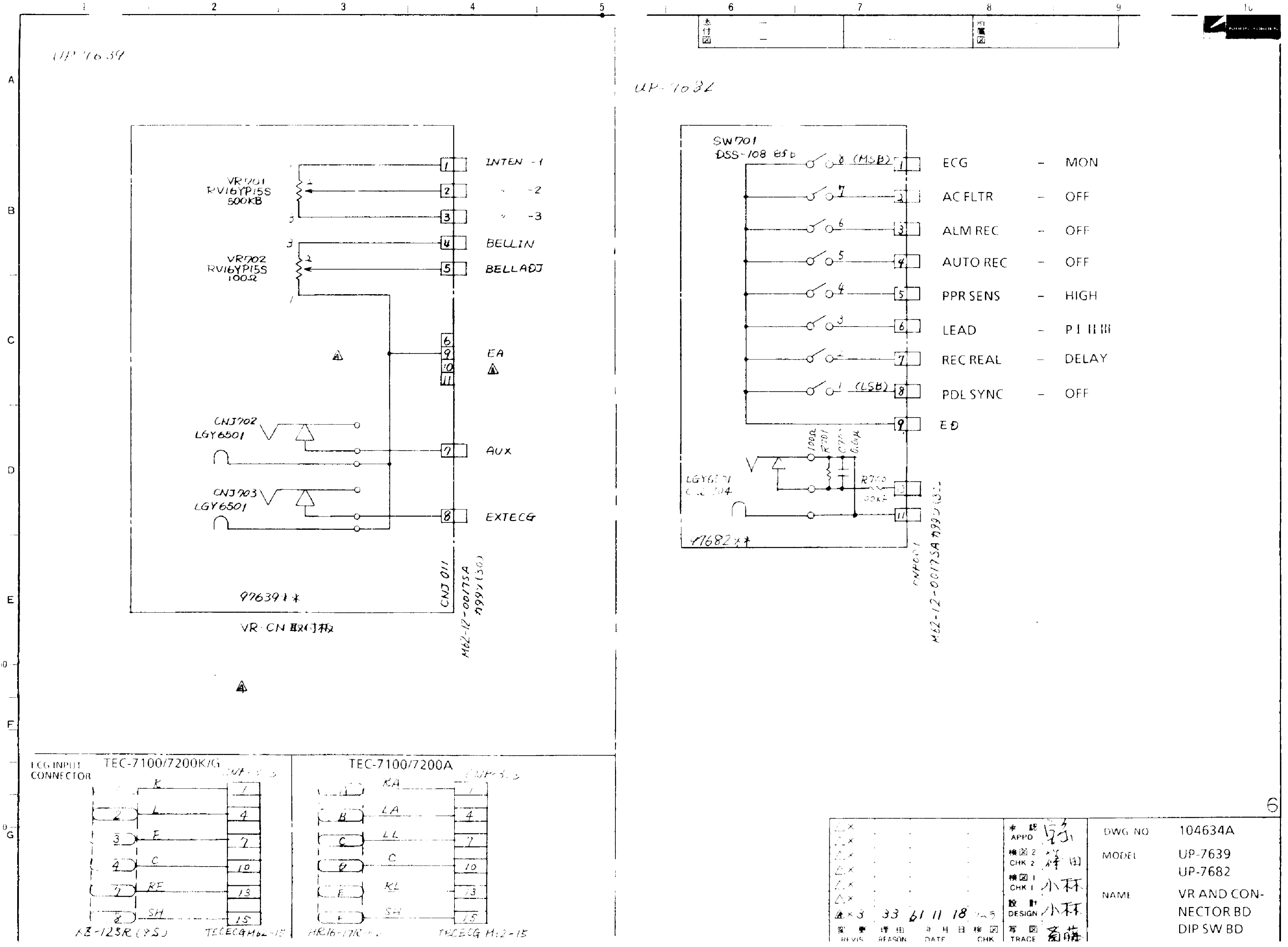


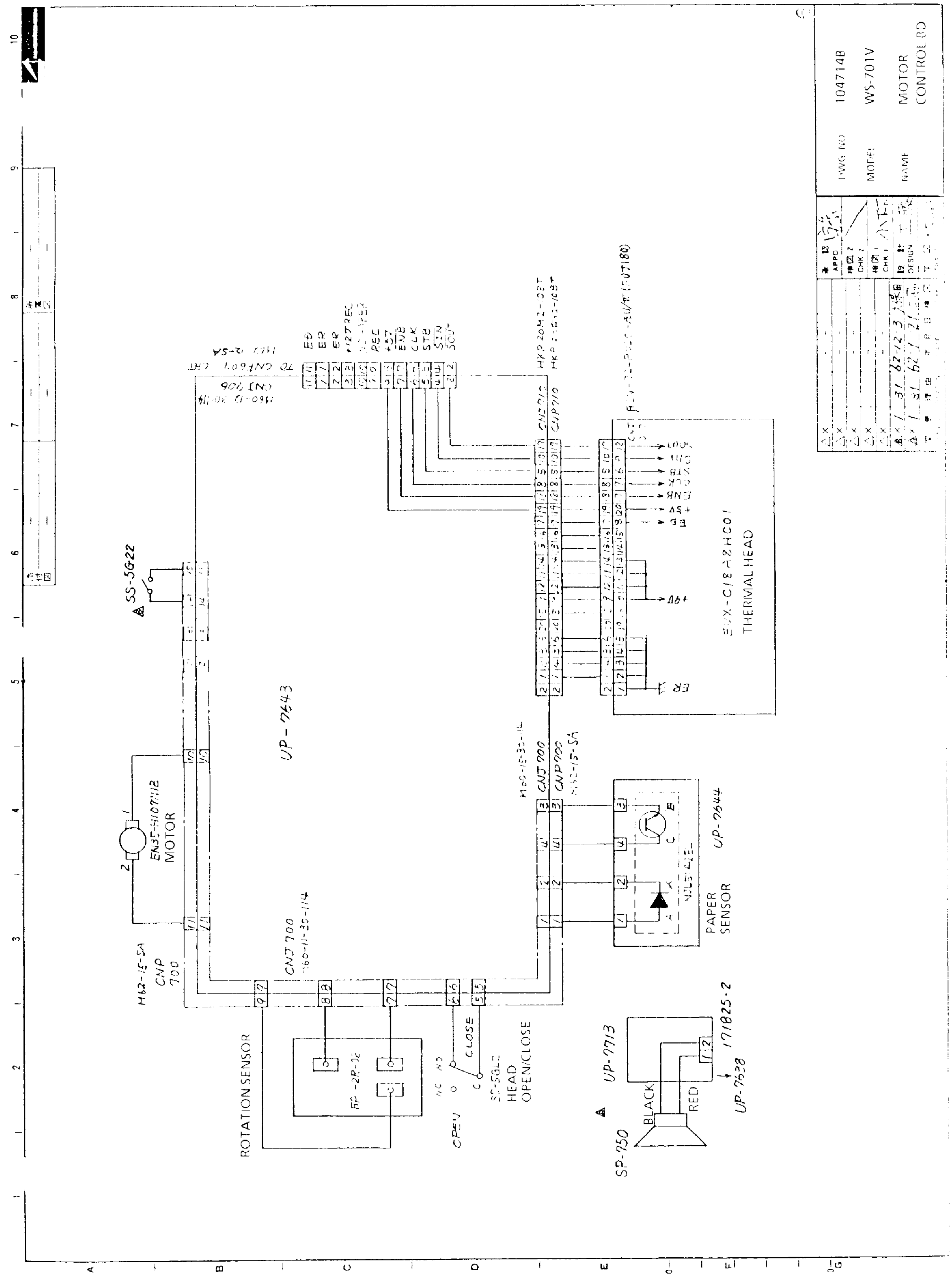
VR701
VR702
4
5
1
2
3
CNJ700②
9
7
8
CNJ702
CNJ703
9763915

DIP SW BD
UP-7682

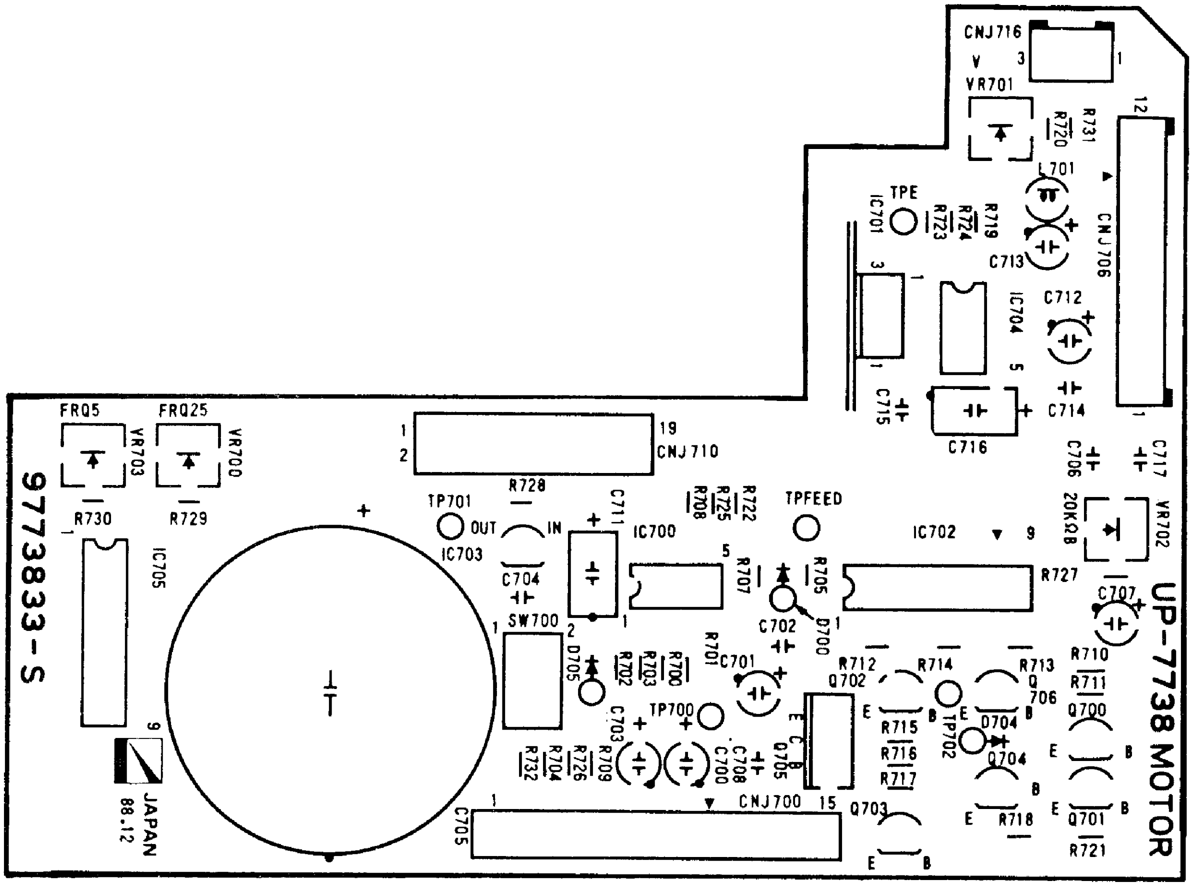


C700
R701
R700
9768215
1 2 3 4 5 6 7 8
SW
701
11
10
9
8
7
6
5
4
3
2
1

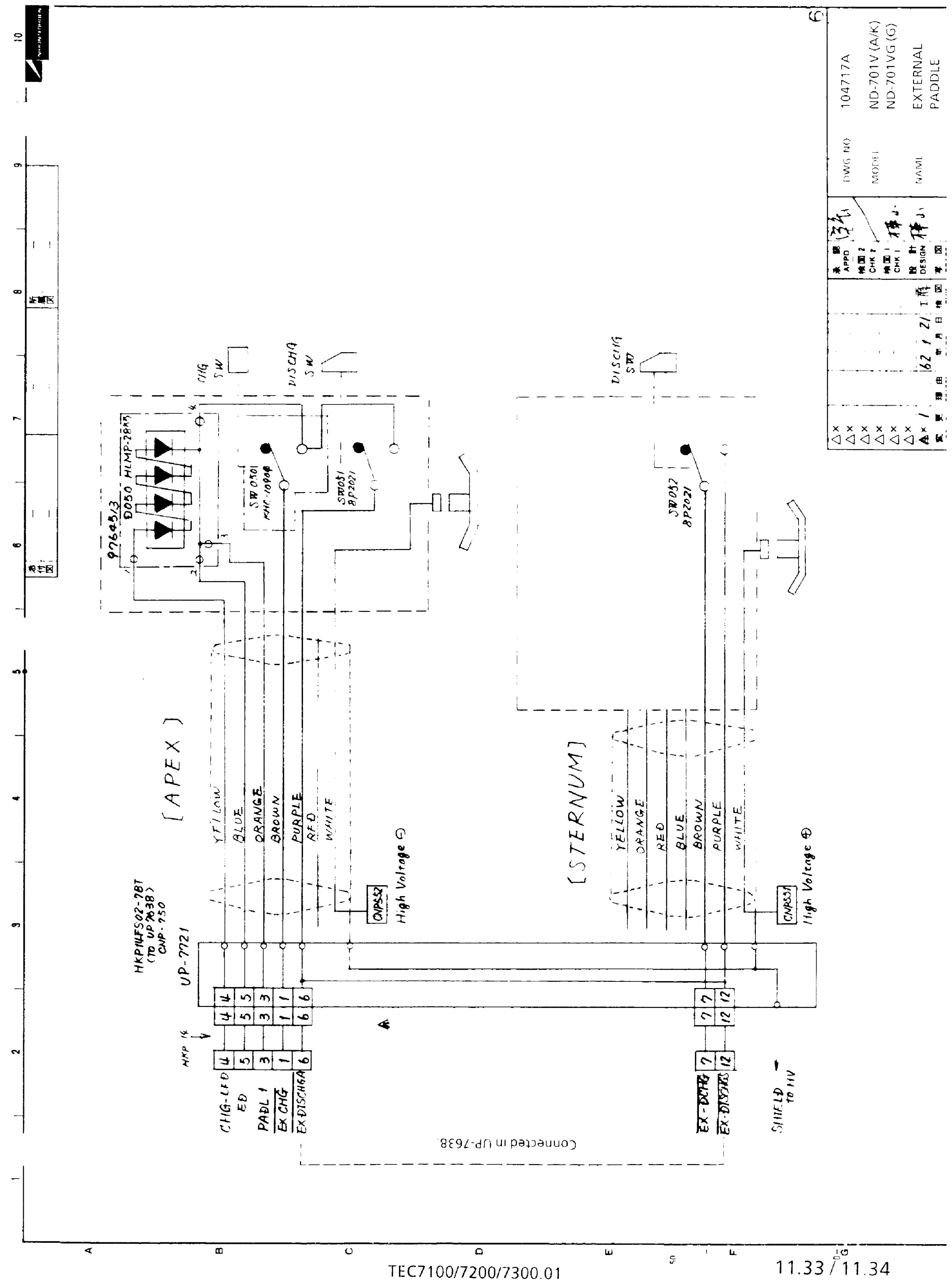

UP-7639
VR701
RV16YP15S
500KB
VR702
RV16YP15S
100Ω
INTEN -1
-2
-3
BELLIN
BELLADJ
EA
AUX
EXTECG
CNJ702
LGY6501
CNJ703
LGY6501
97639**
CNJ 011
M62-12-0017SA
ｶﾞﾜﾝ(30)
VR·CN 取付板
UP-7682
SW701
DSS-108 85D
8 (MSB)
1 (LSB)
ECG - MON
AC FLTR - OFF
ALM REC - OFF
AUTO REC - OFF
PPR SENS - HIGH
LEAD - P I II III
REC REAL - DELAY
PDL SYNC - OFF
ED
R701
100Ω
C701
0.01μ
R700
LGY6101
97682**
CN4001
M62-12-0017SA
ECG INPUT CONNECTOR
TEC-7100/7200K/G
K
L
F
C
RF
SH
XZ-123R
TECECG M62-15
TEC-7100/7200A
RA
LA
LL
C
RL
SH
HR16-17R
TECECG M12-15
DWG NO 104634A
MODEL UP-7639
UP-7682
NAME VR AND CON-NECTOR BD
DIP SW BD
APPD
CHK 2
CHK 1
DESIGN
TRACE
REVIS
REASON
DATE
CHK
33
61 11 18
小林
6

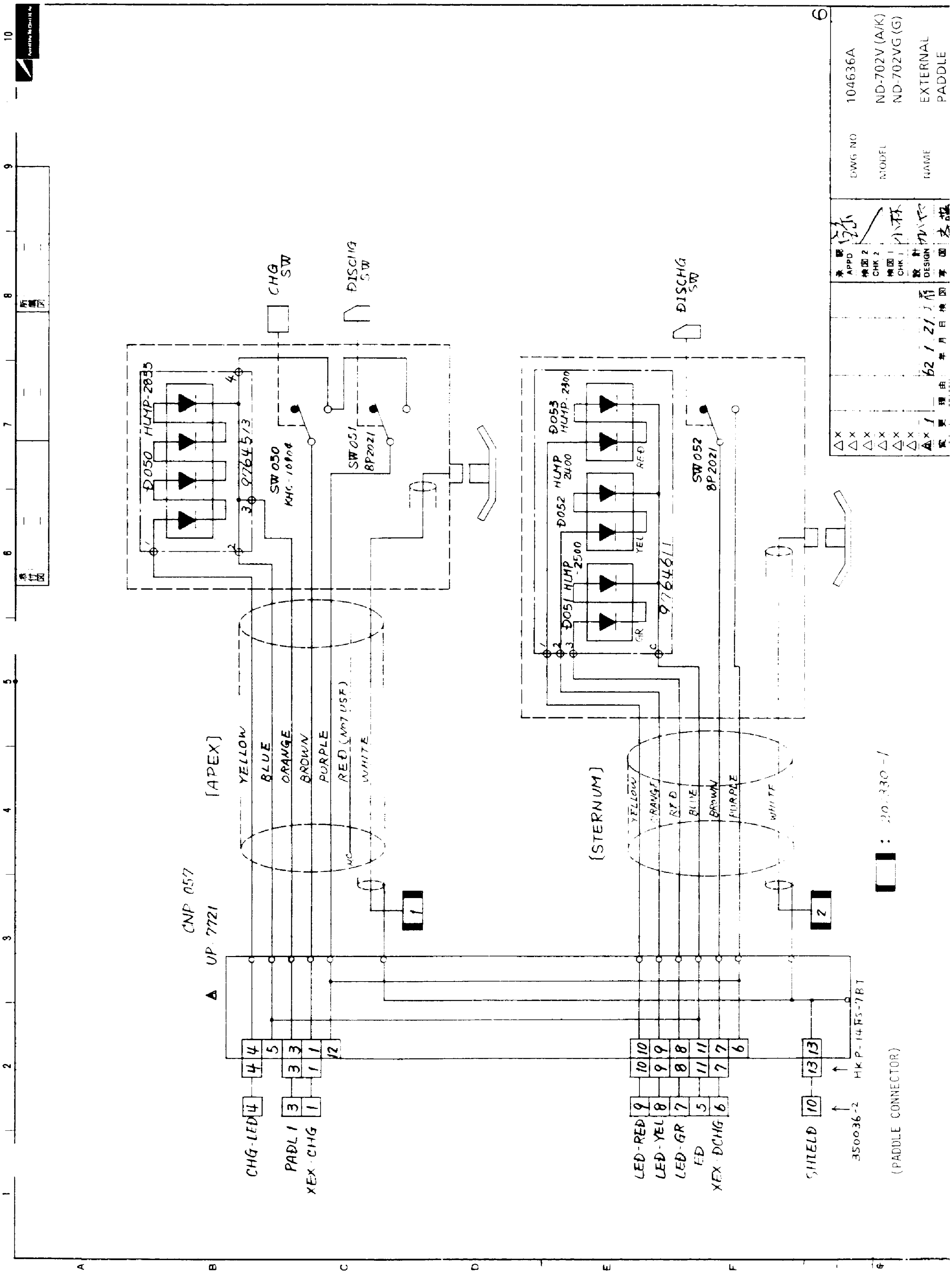

DWG NO 104714B
MODEL WS-701V
NAME MOTOR CONTROL BD
APPD
CHK 2
CHK 1
DESIGN
1 31 62-12-3
1 31 62-1-21
UP-7643
EN35-H107H2 MOTOR
SS-5G22
M62-15-5A
CNP 700
CNJ 700
M60-11-30-114
CNJ 706
TO CN7607 CRT
ED
ER
ER
+12 REC
REC
+5V
ENB
CLK
STB
SIN
SOUT
CNJ 710
CNP 710
HKP 20M2-02T
THERMAL HEAD
+5V
ED
+40V
ER
PAPER SENSOR
UP-7644
CNJ 700
CNP 700
ROTATION SENSOR
OPEN
CLOSE
NC NO
C
SS-5GL2 HEAD OPEN/CLOSE
SP-750
BLACK
RED
UP-7713
171825-2
UP-7638
1
2
3
4
5
6
7
8
9
10
A
B
C
D
E
F
G

MOTOR CONTROL BD
UP-7738

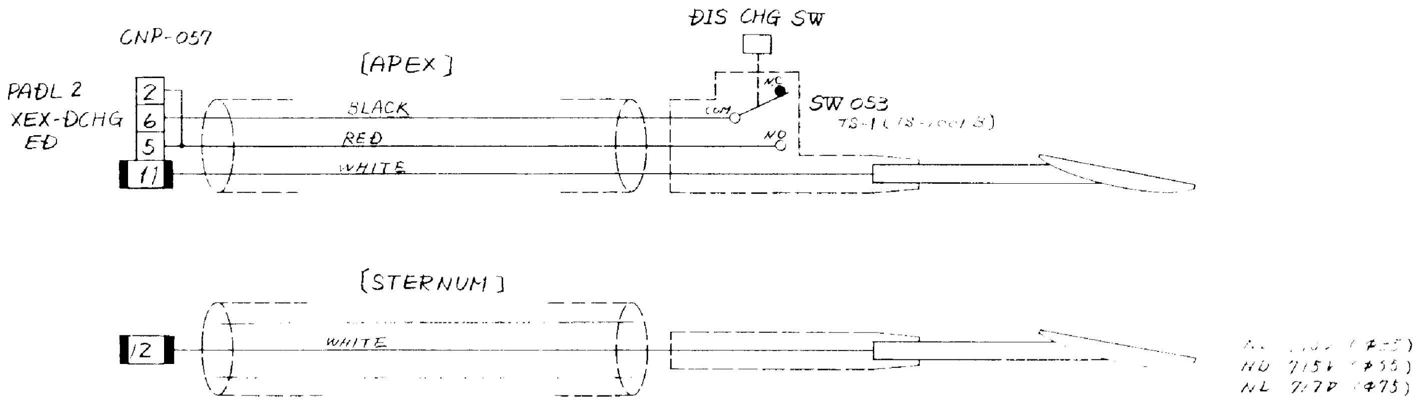


CNJ716
VR701
R720
R731
L701
TPE
IC701
R723
R724
R719
C713
CNJ706
C712
IC704
C714
C715
C716
C706
C717
FRQ5
FRQ25
VR703
VR700
97773833-S
R730
R729
IC705
CNJ710
R728
TP701
OUT
IN
IC703
C711
IC700
R708
R725
R722
TPFEED
IC702
20KΩB
VR702
R727
C704
SW700
R707
R705
C702
D700
C707
UP-7738 MOTOR
R710
R711
D705
R702
R703
R700
R701
C701
R712
Q702
R714
R713
Q706
TP700
C703
R715
R716
R717
TP702
D704
Q704
Q700
R732
R704
R726
R709
C700
C708
D705
R718
Q701
R721
JAPAN
88.12
C705
CNJ700
Q703


DWG NO 104717A
MODEL ND-701V (A/K) ND-701VG (G)
NAME EXTERNAL PADDLE
APPD
CHK 2
CHK 1
DESIGN
62 1 21
[APEX]
[STERNUM]
CHG SW
DISCHG SW
97645/3
D050 HLMP-2887
SW050 KHC-10900
SW051 8P2021
SW052 8P2021
YELLOW
BLUE
ORANGE
BROWN
PURPLE
RED
WHITE
High Voltage ⊖
High Voltage ⊕
CNP552
CNP551
HKP14FS02-7BT (TO UP7638) CNP-750
UP-7721
HKP 14
CHG-LED
PADL 1
EX CHG
EX DISCHGA
EX-DCHG
EX-DISCHG
SHIELD to HV
Connected in UP-7638.
A
B
C
D
E
F
G
1
2
3
4
5
6
7
8
9
10



6
DWG NO 104636A
MODEL ND-702V (A/K)
ND-702VG (G)
NAME EXTERNAL PADDLE
APPD
CHK 2
CHK 1
DESIGN
62 1 21
CHG SW
DISCHG SW
D050 HLMP-2835
9764513
SW050 KHC-10904
SW051 8P2021
D053 HLMP-2400
D052 HLMP 2400
D051 HLMP 2500
9764611
RED
YEL
GR
SW052 8P2021
DISCHG SW
[APEX]
YELLOW
BLUE
ORANGE
BROWN
PURPLE
RED (NOT USE)
WHITE
[STERNUM]
YELLOW
ORANGE
RED
BLUE
BROWN
PURPLE
WHITE
CNP 057
UP 7721
HKP-14HS-7BT
350036-2
(PADDLE CONNECTOR)
CHG-LED
PADL 1
XEX·CHG
LED-RED
LED-YEL
LED-GR
ED
XEX·DCHG
SHIELD
1
2
201330-1


CNP-057
PADL 2
XEX-DCHG
ED
2
6
5
11
12
[APEX]
BLACK
RED
WHITE
DIS CHG SW
COM
NC
NO
SW 053
TS-1 (TS-10013)
[STERNUM]
WHITE
ND 713V (φ35)
ND 715V (φ55)
ND 717V (φ75)

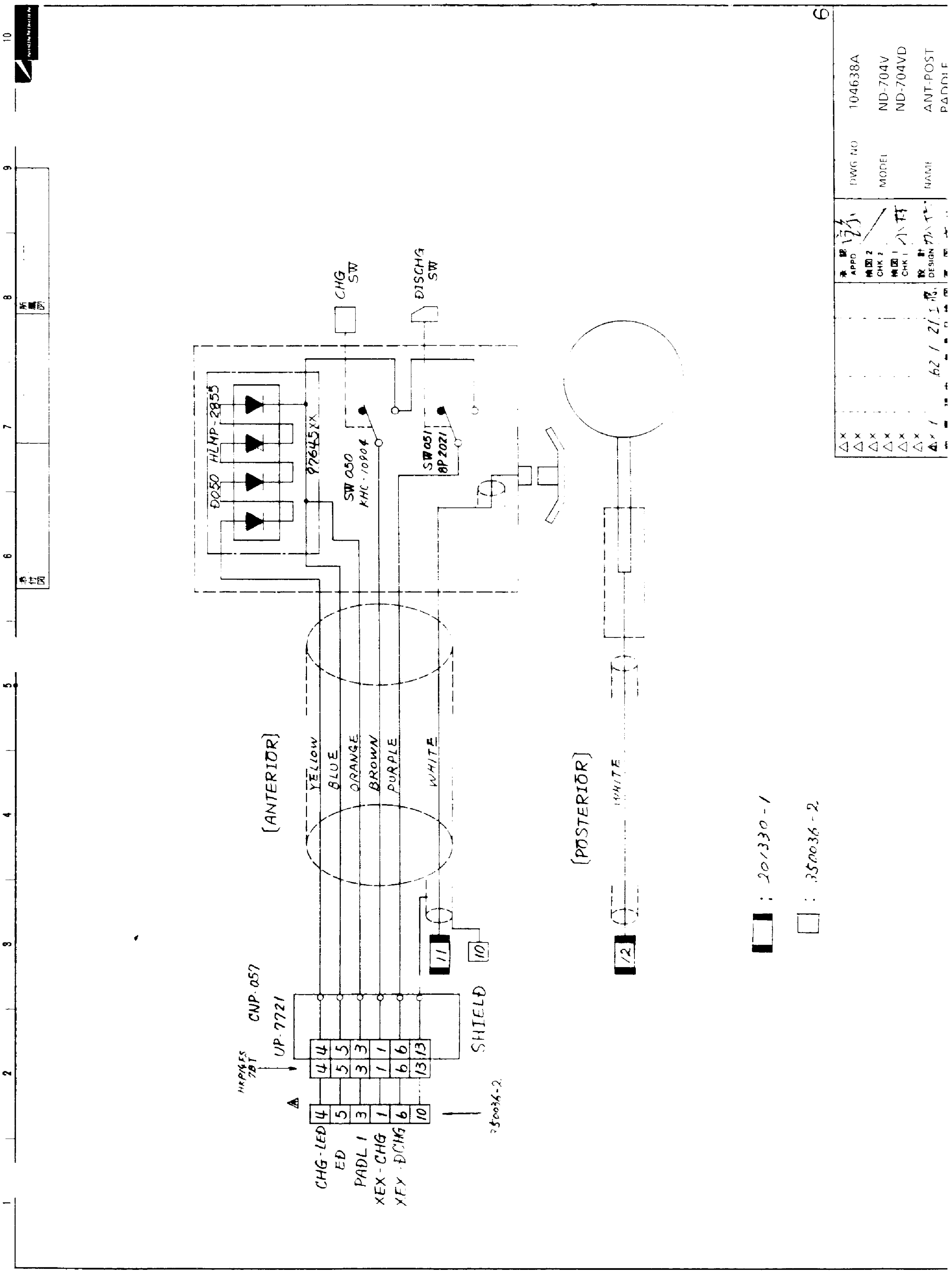
ND-730V : HANDLE
ND-723V ; ND730V + ND713V
ND 725V ; ND730V + ND715V
ND 727V ; ND730V + ND717V

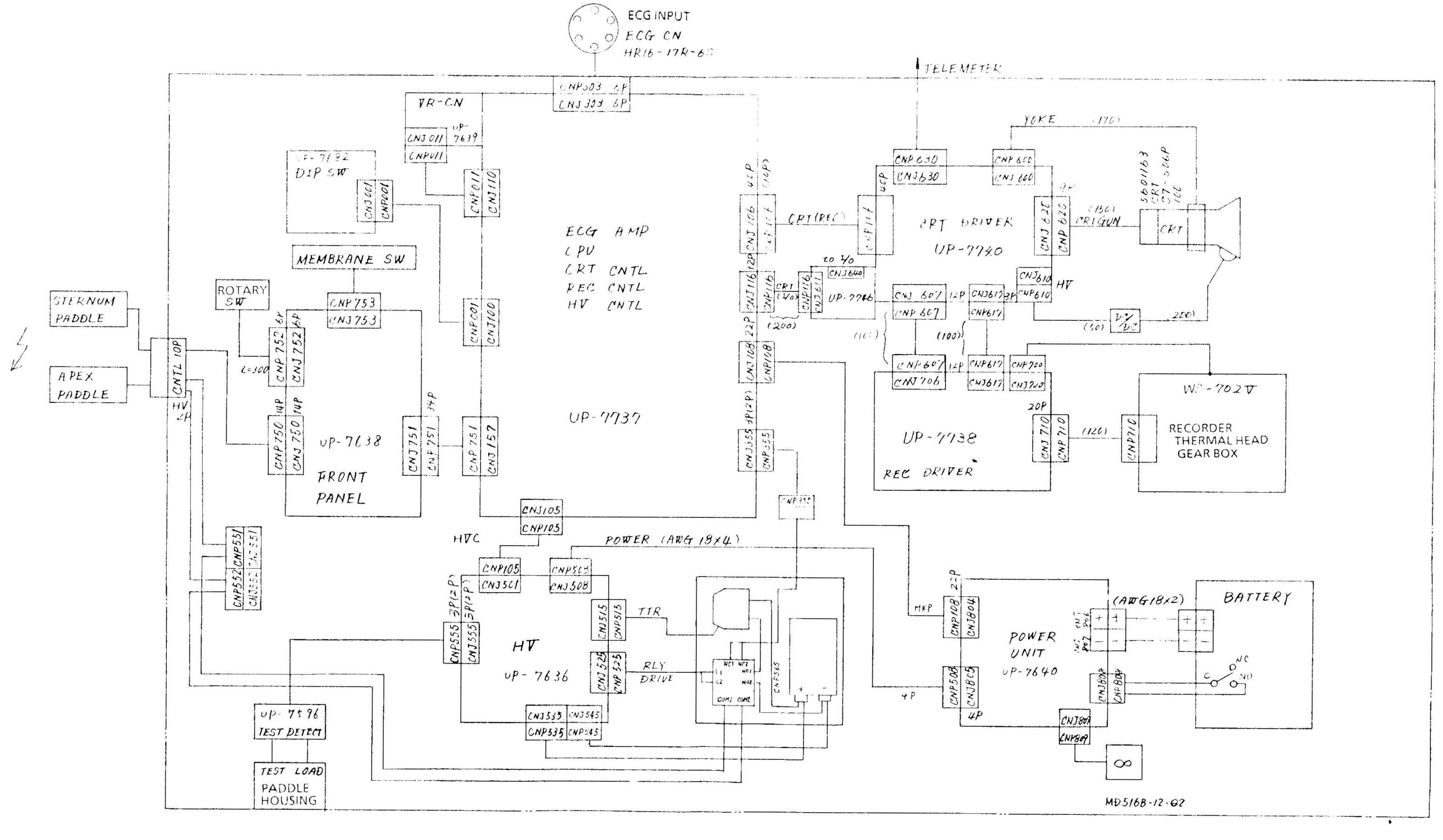
■ : 201330 1
□ : 350036-2

△×				承認 APPD	
△×				検図 2 CHK 2	
△×				検図 1 CHK 1	小林
△×				設計 DESIGN	カバヤマ
△×				写図 TRACE	斎藤
△×					
変更 REVIS	理由 REASON	年月日 DATE	検図 CHK		

6

DWG NO	104637
MODEL	ND-723V ND-725V ND-727V
NAME	INTERNAL PADDLE


DWG NO 104638A
MODEL ND-704V
ND-704VD
NAME ANT-POST PADDLE
APPD
CHK 2
CHK 1
DESIGN
62 / 2 / 1
CHG SW
DISCHG SW
D050 HLMP-2855
97645XX
SW050 KHC-10904
SW051 8P2021
(ANTERIOR)
YELLOW
BLUE
ORANGE
BROWN
PURPLE
WHITE
(POSTERIOR)
WHITE
11
10
12
: 201330-1
: 350036-2
CNP-057
UP-7721
SHIELD
HRP16ES 78T
4 5 3 1 6 13
4 5 3 1 6 13
4 5 3 1 6 10
350036-2
CHG-LED
ED
PADL 1
XEX-CHG
XFY-DCHG
A B C D E F G
1 2 3 4 5 6 7 8 9 10


ECG INPUT
ECG CN
HR16-17R-6
CNP303 6P
CNJ303 6P
TELEMETER
VR-CN
UP-7639
CNJ011
CNP011
UP-7682
DIP SW
CNJ001
CNP001
CNP011
CNJ110
MEMBRANE SW
ROTARY SW
STERNUM PADDLE
APEX PADDLE
CNTL 10P
HV 4P
L=300
CNP752 6P
CNJ752 6P
CNP753
CNJ753
CNP750 14P
CNJ750 14P
UP-7638
FRONT PANEL
CNJ751
CNP751 34P
CNP001
CNJ100
CNP751
CNJ157
ECG AMP
CPU
CRT CNTL
REC CNTL
HV CNTL
UP-7737
CNJ106 40P
CNP106 (40P)
CRT(REC)
CNJ116 12P
CNP116
CRT (I/O)
CNP116
CNJ611
(200)
to I/O
CNJ640
UP-7746
CNJ108 22P
CNP108
CNJ355 3P(2P)
CNP355
CNP355
CNJ105
CNP105
HVC
POWER (AWG 18×4)
CNP630
CNJ630
40P
CNP600
CNJ600
YOKE (170)
CRT DRIVER
UP-7740
CNJ620
CNP620 9P
(150)
CRTGUN
5601163
CRT
37-506P
100
CRT
CNJ610
CNP610
HV
CNJ607
CNP607 12P
CNJ617 3P
CNP617
(100)
(100)
DC/DC
(50)
200)
CNP607
CNJ706 12P
CNP617
CNJ617
CNP700
CNJ700
20P
UP-7738
REC DRIVER
CNJ710
CNP710
(120)
CNP710
WS-702V
RECORDER
THERMAL HEAD
GEAR BOX
CNP551
CNJ551
CNP552
CNJ552
CNP105
CNJ501
CNP508
CNJ508
CNP555 3P(2P)
CNJ555 3P(2P)
HV
UP-7636
CNJ515
CNP515
TTR
CNJ525
CNP525
RLY DRIVE
NC1
NC2
NO1
NO2
L1
L2
COM1
COM2
CNP565
+
-
CNJ535
CNP535
CNJ545
CNP545
UP-7596
TEST DETECT
TEST LOAD
PADDLE HOUSING
MKP
CNP108 22P
CNJ804
POWER UNIT
UP-7640
CNP508
CNJ805 4P
4P
CNJ806
CNJ807
(AWG18×2)
+
-
BATTERY
C
NC
NO
CNJ808
CNP808
CNJ809
CNP809
∞
MD516B-12-02

DWG NO 105560
MODEL TEC-7300
NAME BOARD
CONNECTION

APPD
CHK
DESIGN
REVIS. REASON DATE CHK TRACE

NIHON KOHDEN

CNJ 057 (CHASSIS)

to CNJ 750 (FRONT PANEL)
HKP-14MS-7BT

	1	—	1	$\overline{\text{EX-CHG}}$
	2	—	2	PADL 2
	3	—	3	PADL 1
FRONT PANEL	4	—	4	CHG-LED
to CNJ750	5	—	5	ED
	7	—	6	$\overline{\text{EX-DISCHG}}$
	8	—	7	LED-GR
	9	—	8	LED-YEL
	10	—	9	LED-RED
HV		—	10	SHIELD

CNJ 100 (CPU)
M60-12-30-114P

to CNJ 001 (DIP SW)
M60-12-30-114P

		1	DIP-0
	—	2	DIP-1
	—	3	DIP-2
	—	4	DIP-3
	—	5	DIP-4
	—	6	DIP-5
	—	7	DIP-6
	—	8	DIP-7
	—	9	ED
	—	10	ZBECG+
	—	11	EA
	—	12	

CNJ 105 (CPU)
M60-15-30-114

to CNJ 501 (HV)
M60-15-30-114

		1	CHG ON
		2	INT-RLY
		3	EXT-RLY
		4	$\overline{\text{DCHG CHK}}$
		5	TTRRST
		6	TTR OUT
		7	OVER-CHG
		8	CHG AD
		9	
		10	+8.5V
		11	EA
		12	-8.5V
		13	EARG ADJ
		14	
		15	

CNJ 106 (CPU)
HLF3A50 40D 11

to CNJ 601 (CRT, REC)

12V REC	1	2	$\overline{\text{SOUT}}$
ER	3	4	ER
-6V	5	6	+5V
+6V	7	8	-8.5V
+8.5V	9	10	12V CRT
$\overline{\text{SIN}}$	11	12	STB
PRT CLK	13	14	$\overline{\text{ENB}}$
REC	15	16	NO PAPER
EY	17	18	EY
CH1/$\overline{\text{CH2}}$	19	20	V SYNC
HSYNC	21	22	25/5 mm/s
BLANK 1	23	24	WAVE/$\overline{\text{CHR}}$
BRIGHT	25	26	Y SIG
INTENS-3	27	28	INTENS-2
INTENS-1	29	30	EA
TELEW	31	32	$\overline{\text{ART}}$
$\overline{\text{RCVFLT}}$	33	34	$\overline{\text{TELE}}$
$\overline{\text{CALL}}$	35	36	$\overline{\text{ZBB}}$
CHANNEL AD	37	38	+12VB
ED	39	40	ED

CNJ 108 (CPU)
HKP-22MS-11BT

to CNJ 804 (POWER)
HKP-22MS-11BT

EA	1	2	EA
ED	3	4	ED
ER	5	6	ER
EY	7	8	EY
+5V	9	10	-6V
8.5V	11	12	+6V
+12V CRT	13	14	+8.5V
+12V REC	15	16	BAT CHG
BATT OFF	17	18	AC
+12VB	19	20	POWER ON
+12VB	21		

CNJ 110 (CPU)
M60-12-30-114

to CNJ 011 (VR CONNECTOR BD)
M60-12-30-114

		1	INTENS-1
		2	INTENS-2
		3	INTENS-3
		4	BELL IN
		5	BELL RET
		6	
		7	AUX
		8	EXT ECG
		9	EA
		10	
		11	
		12	

CNJ 116 (CPU)
M60-12-30-114

to CNJ 611 (I/O CONNECTOR BD)
M60-12-30-134

CLK	1	2	RxD
TxD	3	4	RxRDY
$\overline{\text{RTS}}$	5	6	ED
ED	7	8	
EA	9	10	DR. ECG×5
+12VB	11	12	+12VB

DWG NO	105556
MODEL	TEC-7300
NAME	CONNECTOR PIN ASSIGNMENT (1/3)

APPD
CHK 2
CHK 1
DESIGN
TRACE

REVIS REASON DATE CHK

添付図	—	—	所属図	—
	—	—		—

CNJ 157 (CPU)
HiF3FB-34PA-2.54DS
to CNP751 (FRONT PANEL)
HiF2.3A-34D-BC (10)

So	1	2	S1
S2	3	4	S3
RO	5	6	R1
R2	7	8	R3
ESEL-0	9	10	ESEL-1
ESEL-2	11	12	ESEL-3
DISP-0	13	14	DISP-1
DISP-2	15	16	$\overline{\text{EX-CHG}}$
$\overline{\text{EX-DISCHG}}$	17	18	LED-RED
LED-YEL	19	20	LED-GR
CHG-LED	21	22	PADL 1
PADL 2	23	24	BELL OUT
$\overline{\text{CNTL}}$	25	26	BATTCHG
ED	27	28	+5V
ED	29	30	+5V
POWER ON	31	32	+12VB
– –	33	34	—

CNJ 303 (ECG AMP)
M60-15-30-114
to CNJ 003 (ECG CONNECTOR)
HR16-17R-6S

		1	RA (R)
		2	—
		3	—
		4	LA (L)
		5	—
		6	—
		7	LL (F)
		8	—
		9	—
		10	RL (RF)
		11	—
		12	—
		13	V (C)
		14	—
		15	SHIELD

CNJ511 (HV)
350543-1 (AMP)
to CNJ 805 (POWER)
350543-1 (AMP)

		1	+12VCHG
		2	+12VCHG
		3	ECHG
		4	ECHG

CNJ 355 (ECG AMP)
M60-3-30-114
to CNJ 553 (HV UNIT)
M60-3-30-114

		1	P-ECG S
		2	—
		3	P-ECG A

CNJ 600 (CRT)
HKP-10M55-1T
to YOKE

		1	X1
		2	X2
		3	Y1
		4	Y2
		5	YP2
		6	YP1

CNJ 617 (CRT)
M60-03-30-134
to CNJ 716 (REC)
M60-03-30-114

		1	25/5 mm/s
		2	
		3	

CNJ 640 (I/O CONNECTOR BD)
M60-12-30-134
to OPTIONAL UNIT

CLK	1	2	RxD
TxD	3	4	RXRDY
$\overline{\text{RTS}}$	5	6	ED
ED	7	8	
	9	10	
	11	12	

CNJ 611 (I/O CONNECTOR BD)
M60-12-30-134
to CNJ 116 (CPU)

CLK	1	2	RxD
TxD	3	4	RxRDY
$\overline{\text{RTS}}$	5	6	ED
ED	7	8	
EA	9	10	OP.ECG x5
+12VB	11	12	+12VB

CNJ 607 (CRT)
M60-12-30-114
to CNJ 706 (REC)
M60-12-30-114

		1	ER
		2	ER
		3	+12VREC
		4	$\overline{\text{SIN}}$
		5	STB
		6	PRT CLK
		7	$\overline{\text{ENB}}$
		8	+5V
		9	REC
		10	NOPAPER
		11	EE
		12	$\overline{\text{SOUT}}$

CNJ 620 (CRT)
M60-9-30-114
to CRT NECK
S7-506P-100

		1	G1
		2	K
		3	H
		4	H
		5	
		6	G2
		7	G4

CNJ 808 (POWER)
171825-2
to BATTERY

		1	LED +
		2	LED -

CNJ 806 (POWER)
170267-1
to BATTERY

		1	BAT +

CNJ 807 (POWER)
170267-1
to BATTERY

		1	BAT -

承認 APPD		DWG NO 105557
検図2 CHK 2		MODEL TEC-7300
検図1 CHK 1	小林	NAME CONNECTOR PIN ASSIGNMENT (2/3)
設計 DESIGN	小林	

CNJ 630 (CRT)
M60-15-30-134
to TELEMETER

	1	2	
+5V	3	4	-6V
+6V	5	6	ED
EA	7	8	+12VB
CHANNEL AD	9	10	$\overline{ZBB}$
$\overline{CALL}$	11	12	$\overline{TELE}$
$\overline{RCVFLT}$	13	14	$\overline{ART}$
TELEW	15		

CNJ 700 (REC)
M60-11-30-114
to RECORDER

		1	SENS A
		2	SENS K
		3	SENS E
		4	SENS C
		5	LVR-COM
		6	LVR-N.O
		7	SENS-−
		8	SENS-+
		9	SENS-OUT
		10	MOTOR1
		11	MOTOR2
		12	FEED-A
		13	FEED-K
		14	FEED-C
		15	FEED-E

CNJ 710 (REC)
HKP-20MS10BT
to (THERMAL HEAD)

ER	1	2	ER
ER	3	4	ER
STB	5	6	ER
ED	7	8	CLK
+9V	9	10	$\overline{SIN}$
+9V	11	12	+9V
	13	14	+9V
	15	16	
$\overline{SOUT}$	17	18	$\overline{ENB}$
+5V	19	20	

CNJ 750 (FRONT PANEL)
HKP-14MS-7BT
to CNJ 057 (PADDEL CONNECTOR)

$\overline{EX-CHG}$	1	2	PADL 2
PADL 1	3	4	CHG-LED
ED	5	6	$\overline{EX-DISCHG\cdot A}$
$\overline{EX-DISCHG}$	7	8	LED-GR
LED-YEL	9	10	LED-RED
ED	11	12	$\overline{EX-DISCHG-S}$
—	13	14	—

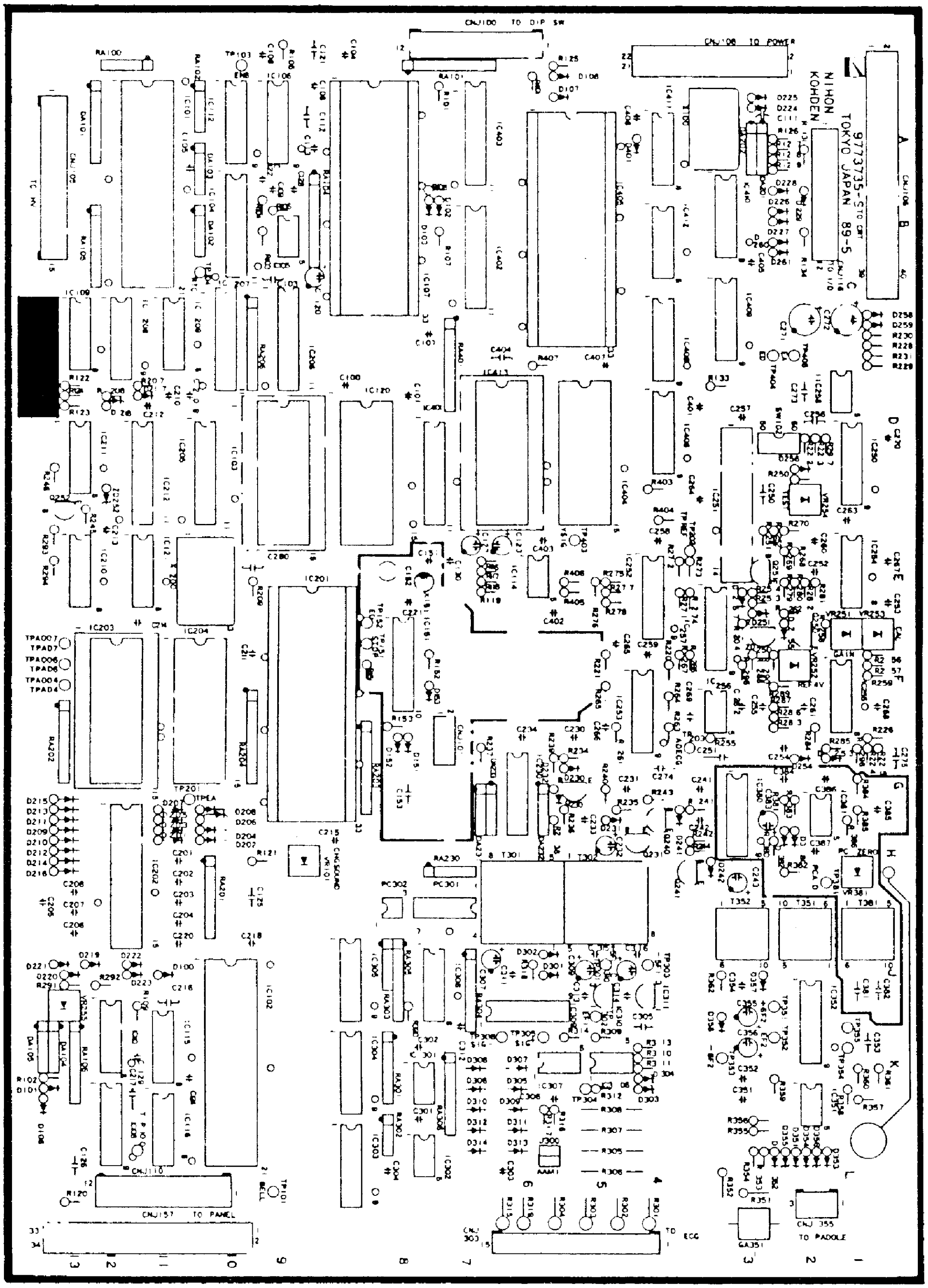
CNJ 752 (ENERGY SELECTOR)
M60-06-30-114P

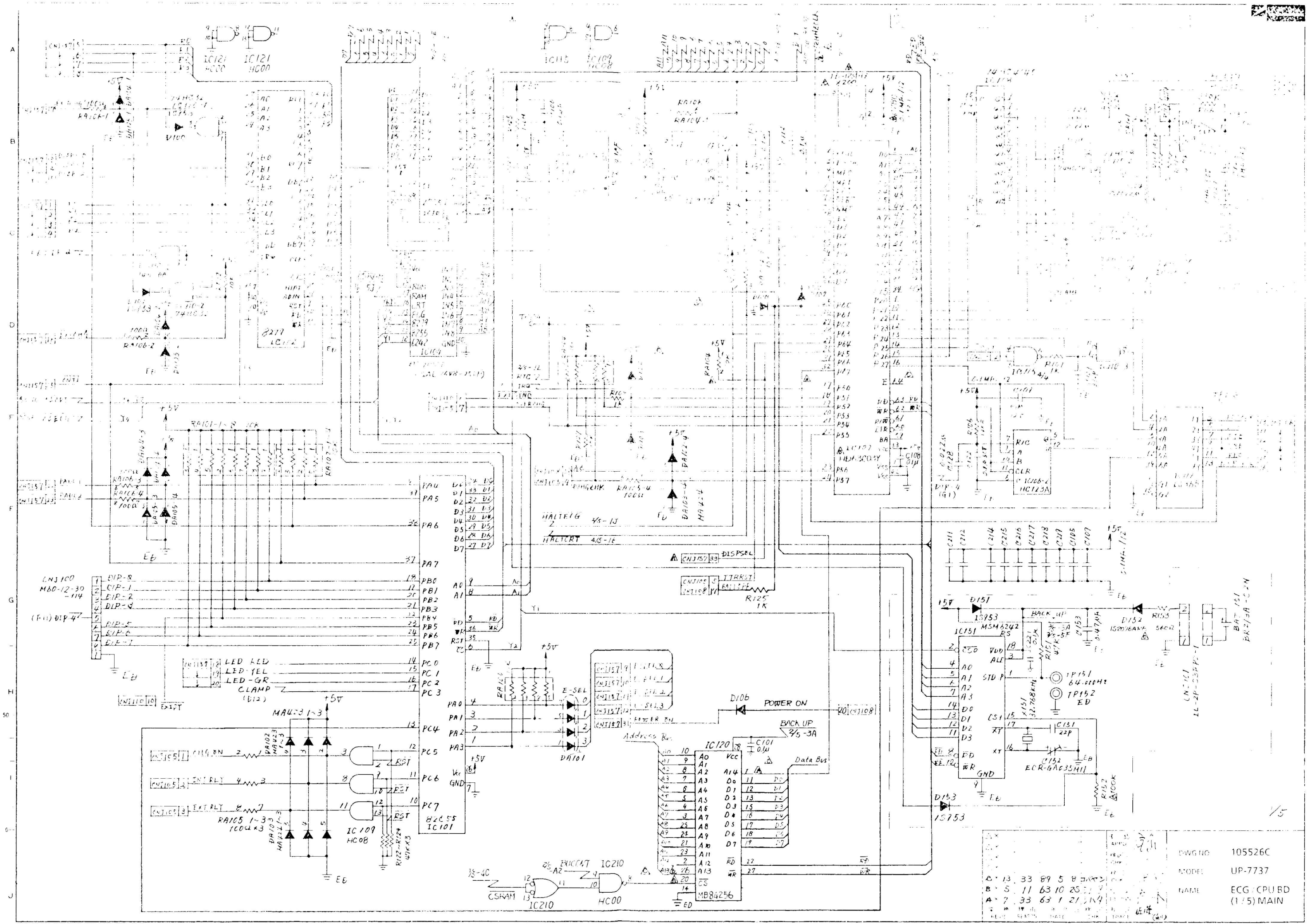
ESEL 0	1	2	ESEL 1
ESEL 2	3	4	ESEL 3
ED	5	6	POWER ON

△×				承認 APPD	DWG NO	105558
△×				検図 2 CHK 2	MODEL	TEC-7300
△×				検図 1 CHK 1	NAME	CONNECTOR PIN ASSIGN MENT (3/3)
△×				設計 DESIGN		
△×				写図 TRACE		
△×						
△×						
変更 REVIS	理由 REASON	年月日 DATE	検図 CHK			

ECG / CPU BD

UP-7737


CNJ100 TO DIP SW
CNJ106 TO POWER
NIHON
KOHDEN
TOKYO JAPAN 89-5
9773735-510
CNJ108
CNJ118 TO I/O
CNJ157 TO PANEL
CNJ110
CNJ303
TO ECG
CNJ 355
TO PADDLE
GA351
IC201
IC203
IC204
IC413
T301
T302
T352
T351
T381
VR381
VR251
VR253
GAIN
REF 4V
PC ZERO
A
B
C
D
E
F
G
H
J
K
L
1
2
3
4
5
6
7
8
9
10
11
12
13

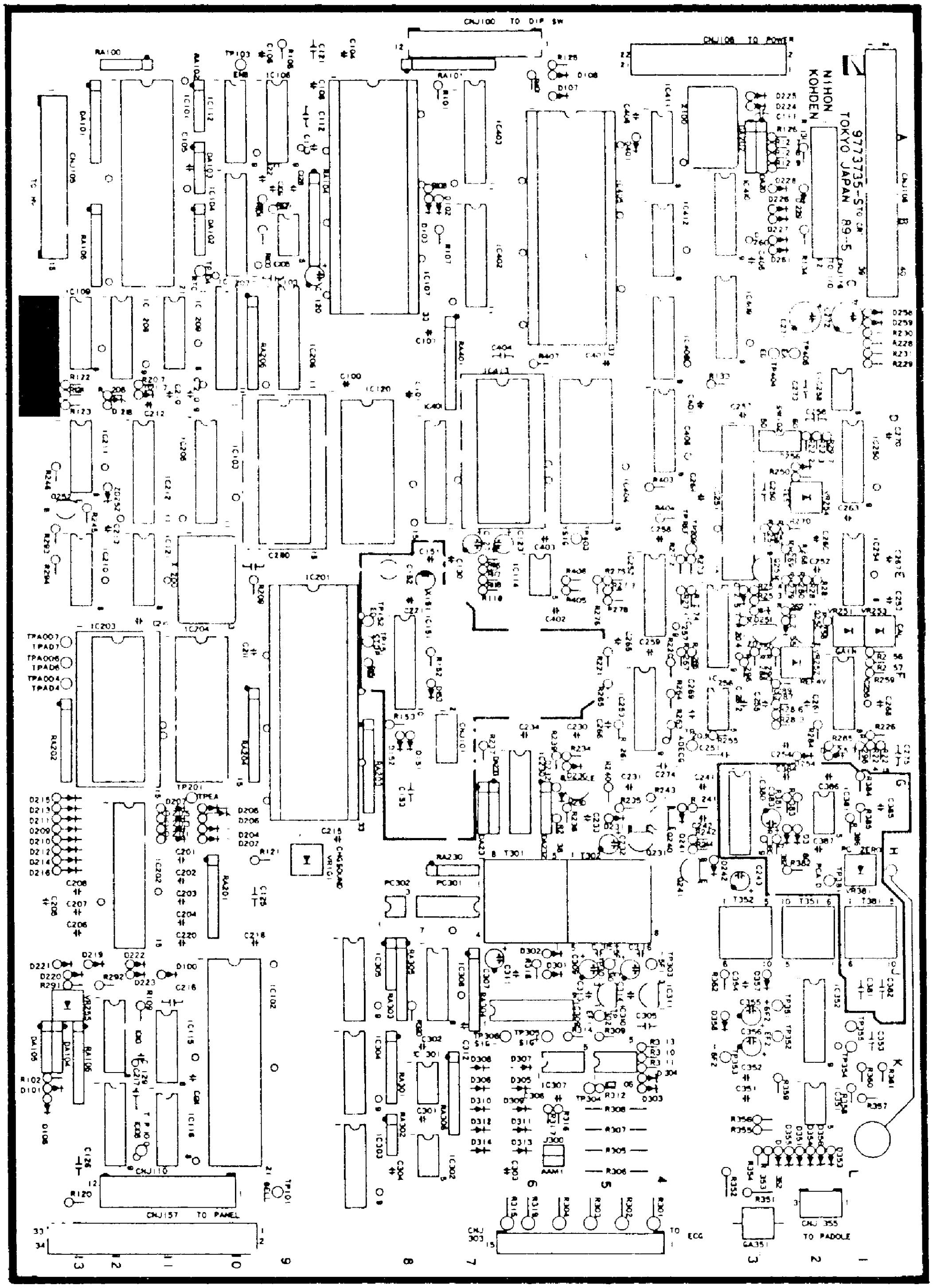

IC121 HC00
IC115
IC109 HC08
8277
IC102
IC107
HD63B03Y
82C55
IC101
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
PC0
PC1
PC2
PC3
PC4
PC5
PC6
PC7
D0
D1
D2
D3
D4
D5
D6
D7
A0
A1
RD
WR
RST
CS
Vcc
GND
CN3100
M60-12-30-114
DIP-R
DIP-1
DIP-2
DIP-4
(F10) DIP 47
DIP-5
DIP-6
DIP-7
LED RED
LED YEL
LED GR
CLAMP
(B12)
MA4023 1~3
CHG ON
INT RLY
EXT RLY
RA105 1~33 100Ω×3
DA103 MA113 1~3
RST
+5V
E-SEL
DA101
D106
POWER ON
BACK UP
4/5-3A
Address Bus
Data Bus
IC120
MB84256
C101 0.1μ
CS RAM
IC210
HC00
HALT ECG 4/5-1J
HALT CRT 4/5-1E
DISPSEL
R125 1K
D151
1S953
D152
1S2076A
R153
560Ω
BACK UP
IC151
MSM6242 RS
ALE
STD P
CS1
XT
TP151 64.000Hz
TP152 ED
X151 32.768KHz
C151 22P
C152 ECR-GA035M11
R152 100K
D153
1S953
BAT 151
DIP-4 (G1)
IC106-2 HC123A
ED
1/5

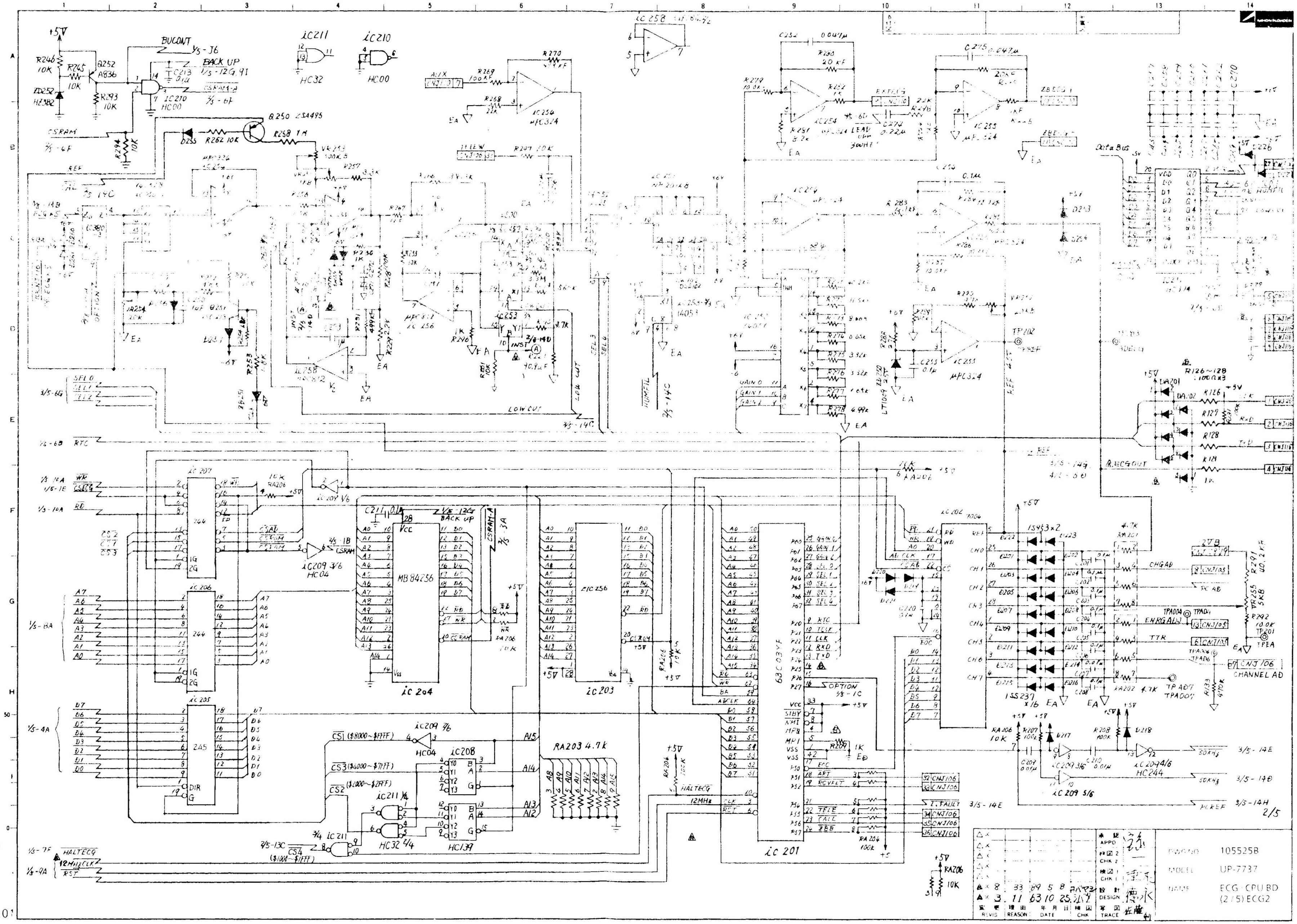
DWG NO	105526C
MODEL	UP-7737
NAME	ECG / CPU BD (1/5) MAIN

C 13 . 33 89 5 8 コバヤシ
B 5 . 11 63 10 25
A 7 . 33 63 1 21

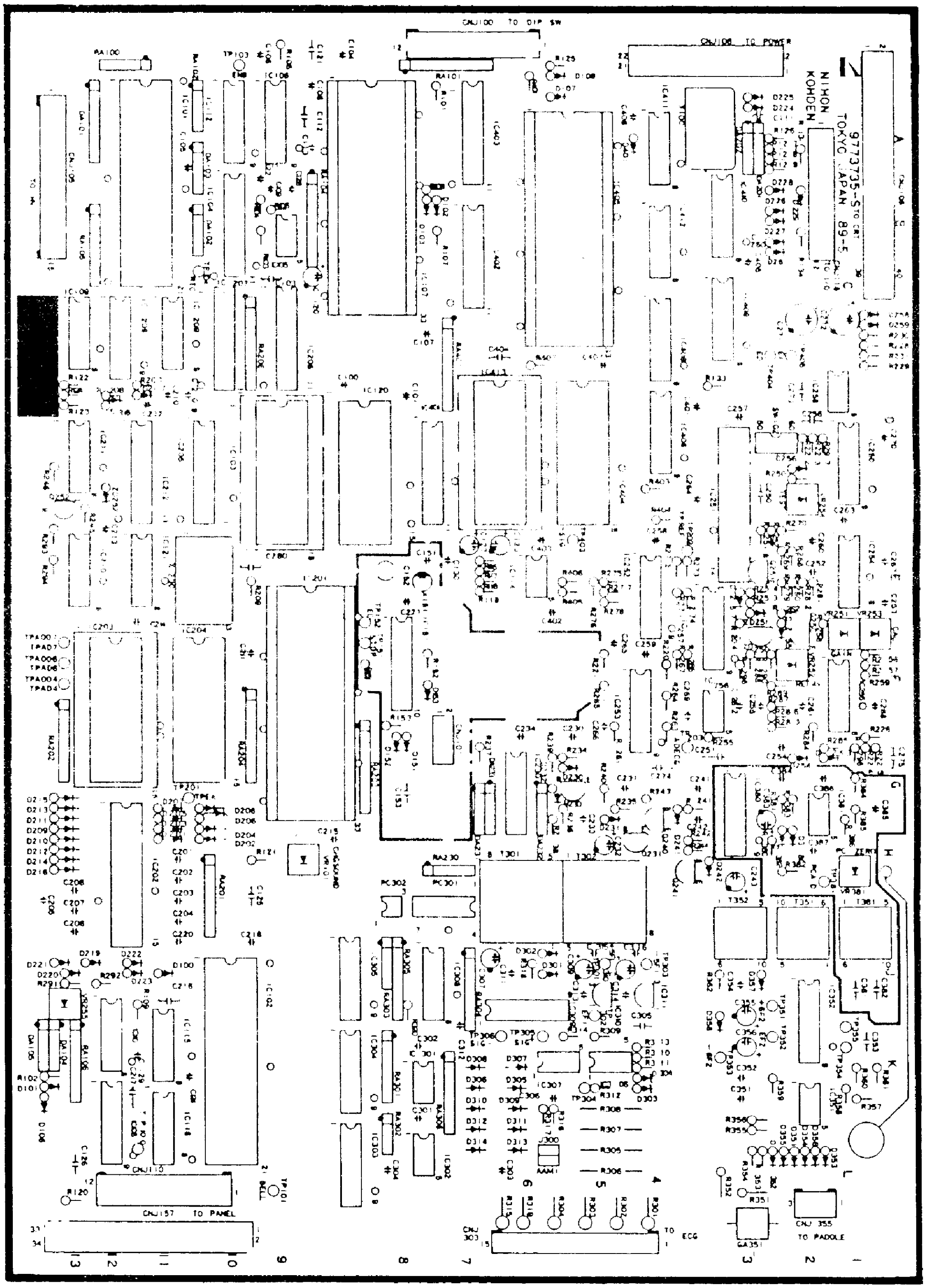
ECG / CPU BD

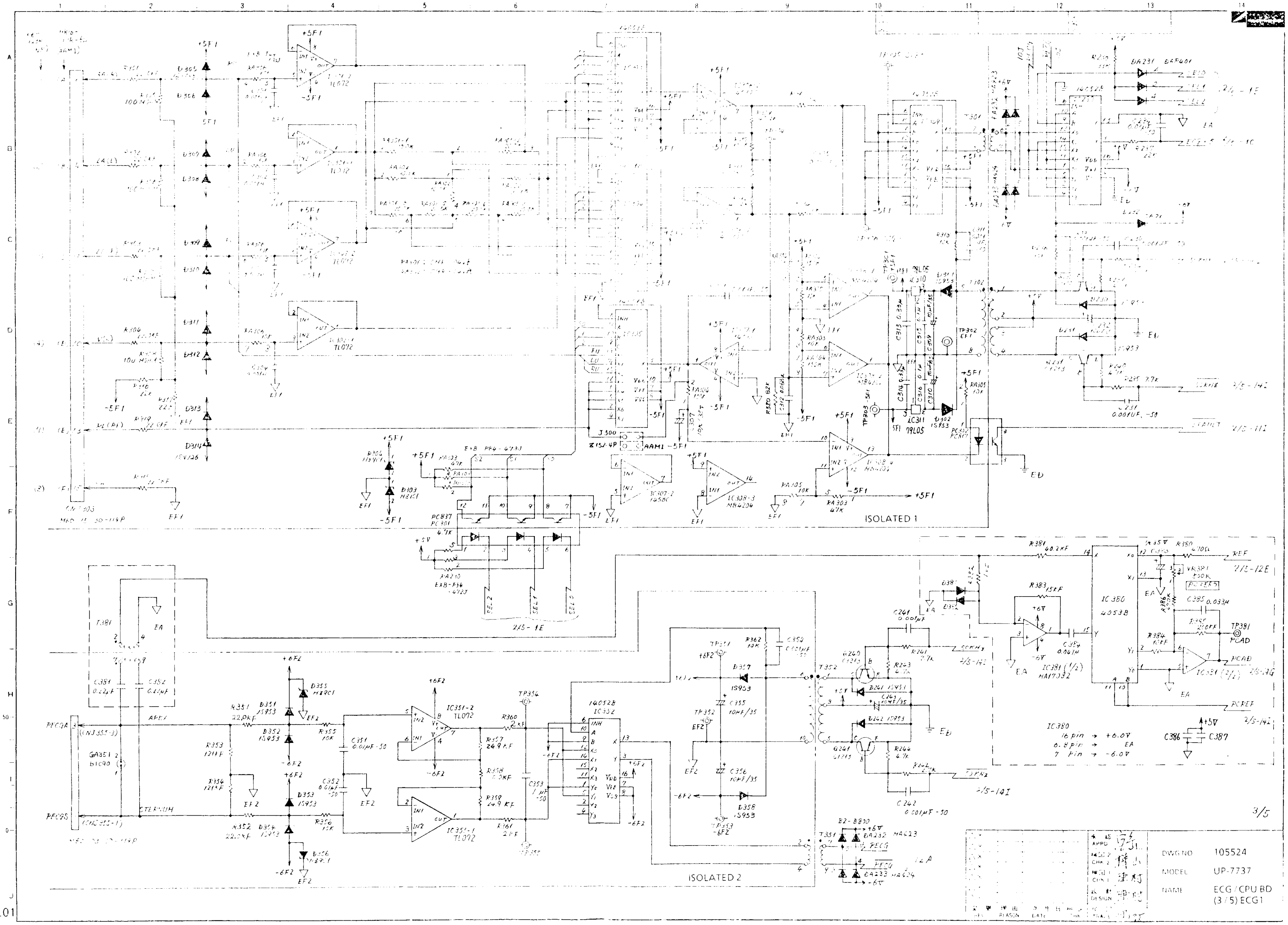
UP-7737


CNJ100 TO DIP SW
CNJ108 TO POWER
NIHON KOHDEN
TOKYO JAPAN
9773735-5
CNJ110
CNJ157 TO PANEL
CNJ 303
TO ECG
CNJ 355
TO PADDLE
GA351
T301
T302
T351
T352
T381
IC201
IC203
IC204
IC102
VR251
VR252


iC211 HC32
iC210 HC00
iC258
iC256 μPC324
iC255 μPC324
iC254 μPC324
iC253 14053
iC207 244
iC206 244
iC205 245
iC209 HC04
iC208 HC139
iC211 HC32
MB84256
iC204
iC256
iC203
63C03YF
iC201
iC202 1004
1SS33 x2
1SS237 x16
RA203 4.7k
CHGAD
ENRGALN
TTR
CHANNEL AD
HALTECG
12MHz CLK
RST
BUCONT
BACK UP
CSRAM
Data BUS
2/5
APPD
CHK 2
CHK 1
DESIGN
TRACE
REVIS
REASON
DATE
CHK
8 33 89 5 8
3 11 63 10 25
佐藤
DWG NO 105525B
MODEL UP-7737
NAME ECG CPU BD (2/5) ECG2

ECG / CPU BD
UP-7737

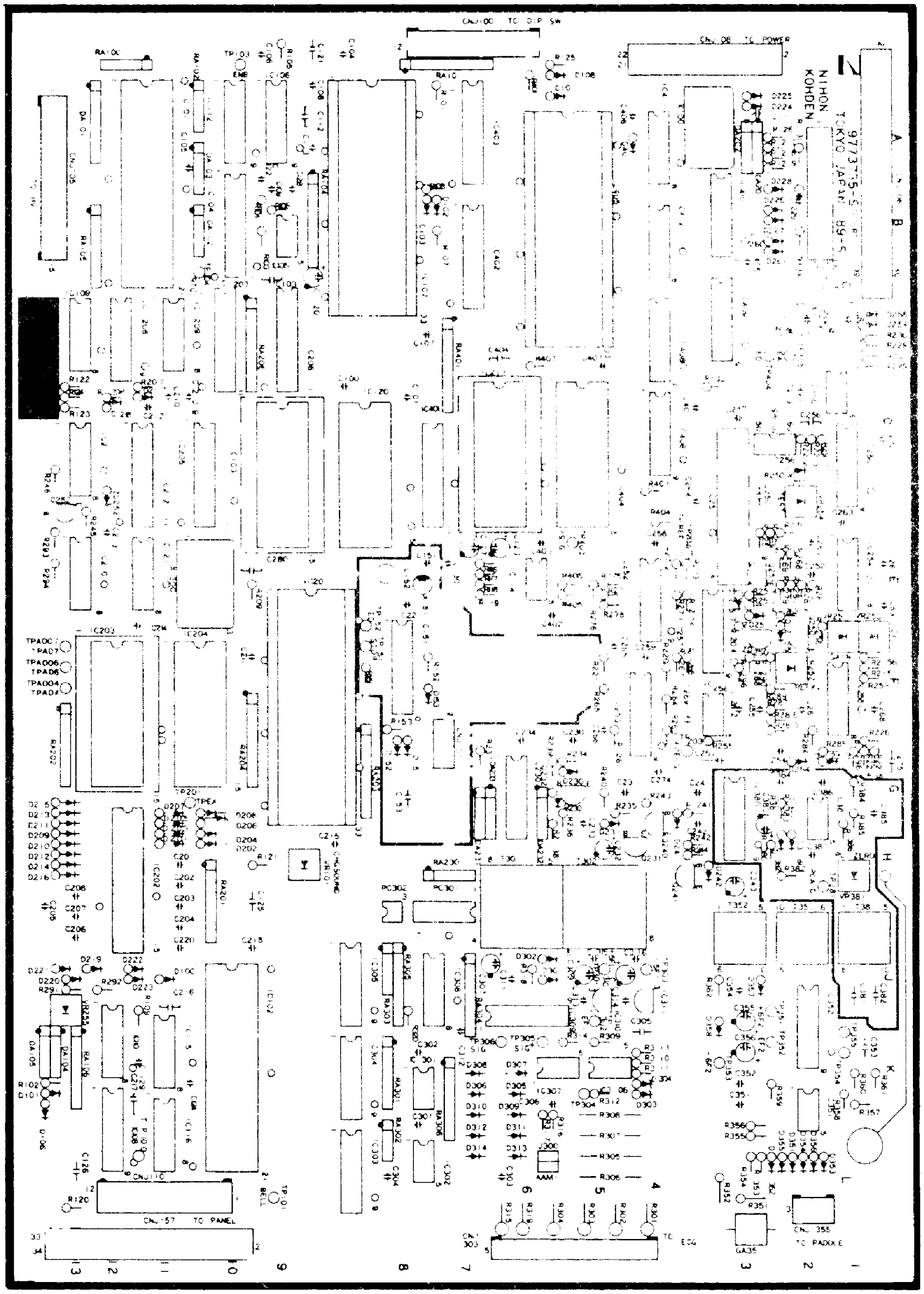

CNJ100 TO DIP SW
CNJ106 TO POWER
NIHON KOHDEN
TOKYO JAPAN 89-E
CNJ157 TO PANEL
CNJ 303
TO ECG
CNJ 355
TO PADDLE
GA351
T301
T302
T352
T351
T381
IC201
IC203
IC204
IC202
IC102
TP101
TP201
RA100
RA101
RA230
RA201
RA202
PC301
PC302
VR251
VR253
VR381
VR255
AAM1
13
12
11
10
9
8
7
6
5
4
3
2
1

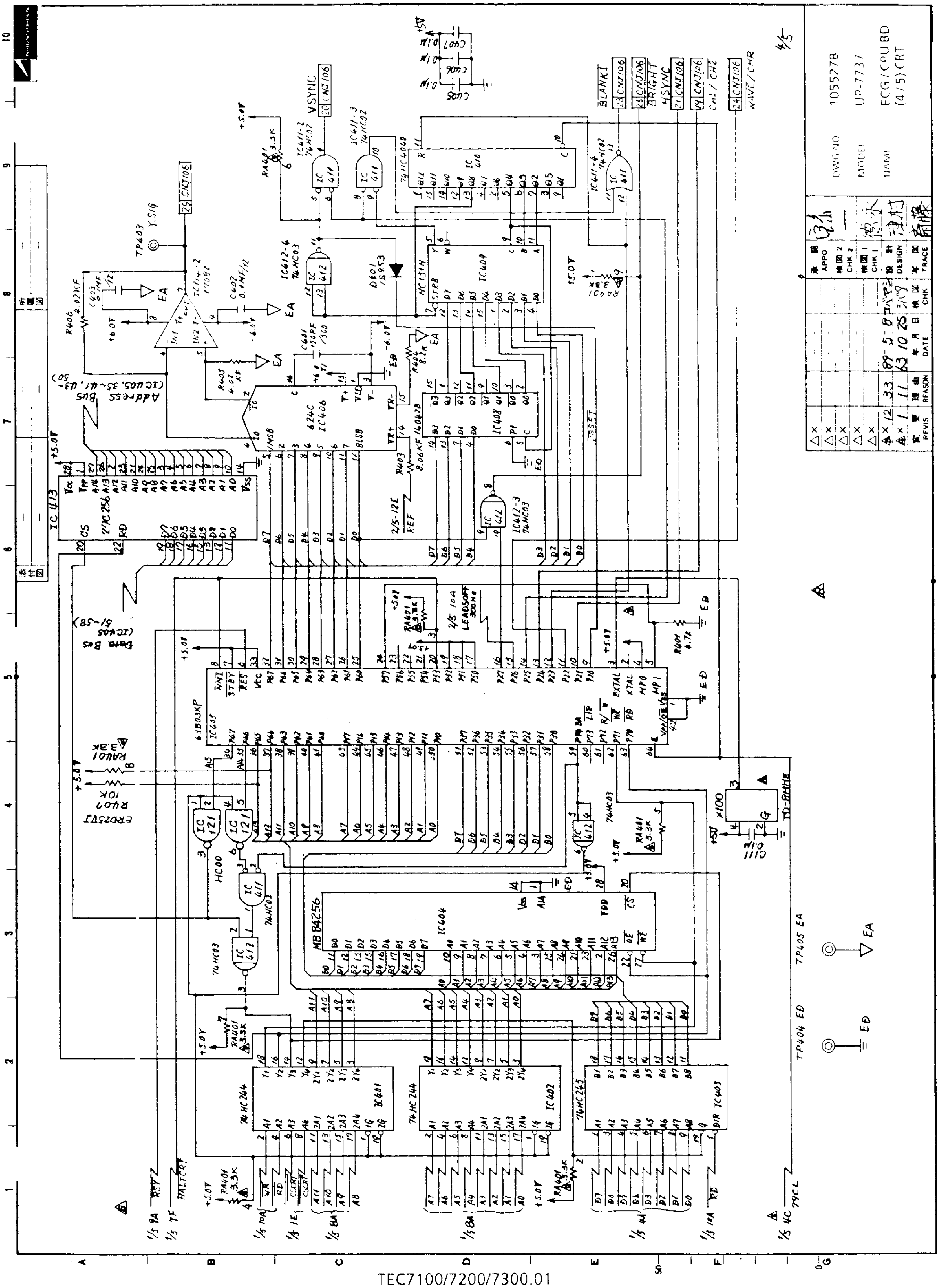

ISOLATED 1
ISOLATED 2
IC380
4053B
IC381 (1/2)
HA17032
IC351-2
TL072
IC351-1
TL072
14052B
IC352
IC311
79L05
TP381
PCAD
PCAD
PCREF
REF
T351
T352
T381
GA351
EA
Eb
EF1
EF2
+5F1
-5F1
+6F2
-6F2
IC380
16 pin → +6.0V
6, 8 pin → EA
7 pin → -6.0V
C386
C387
+5V
2/5-14I
2/5-12E
2/5-1E
3/5

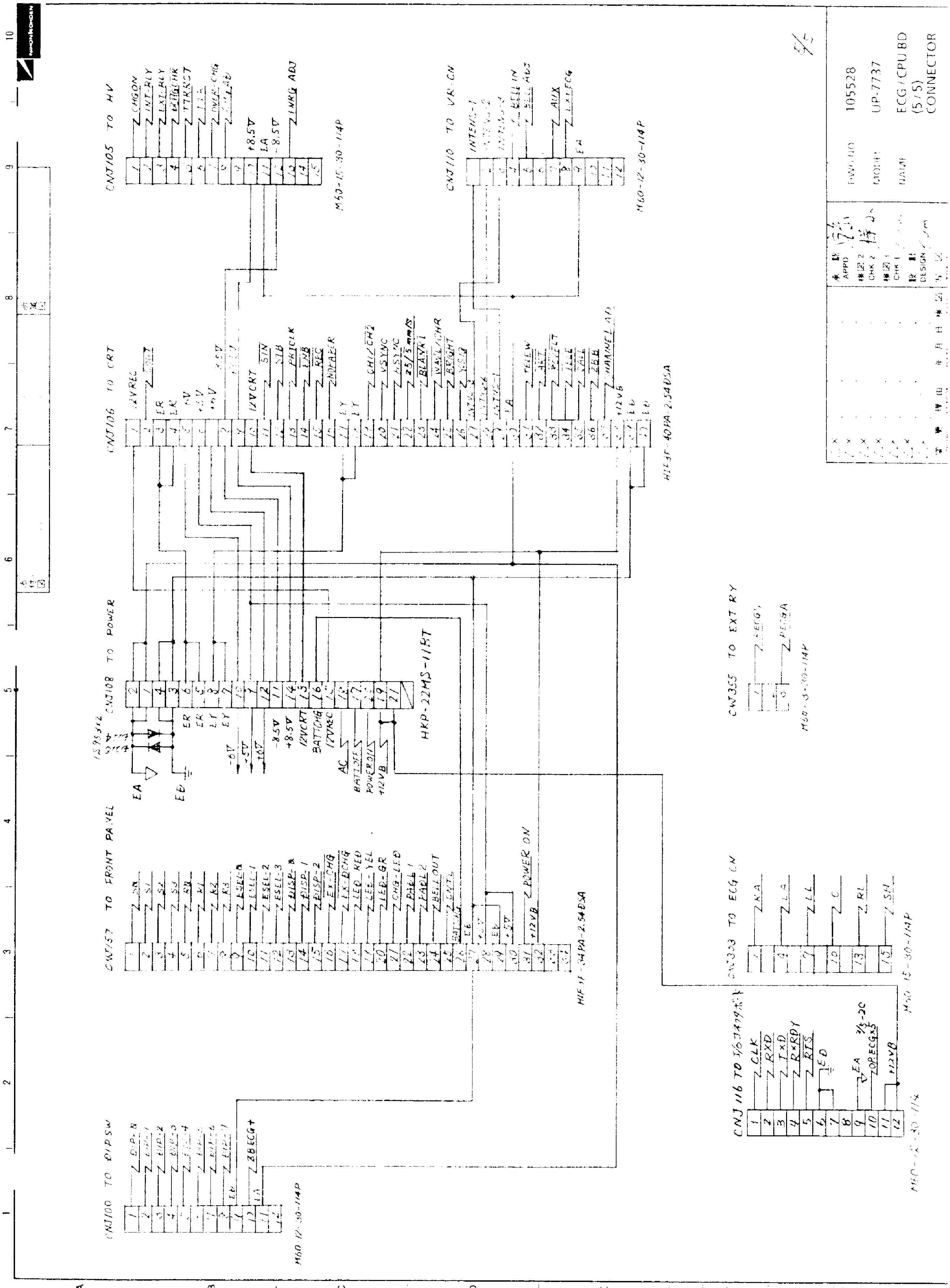
APPD
CHK 2
CHK 1
DESIGN
REV
REASON
DATE
CHK
TRACE

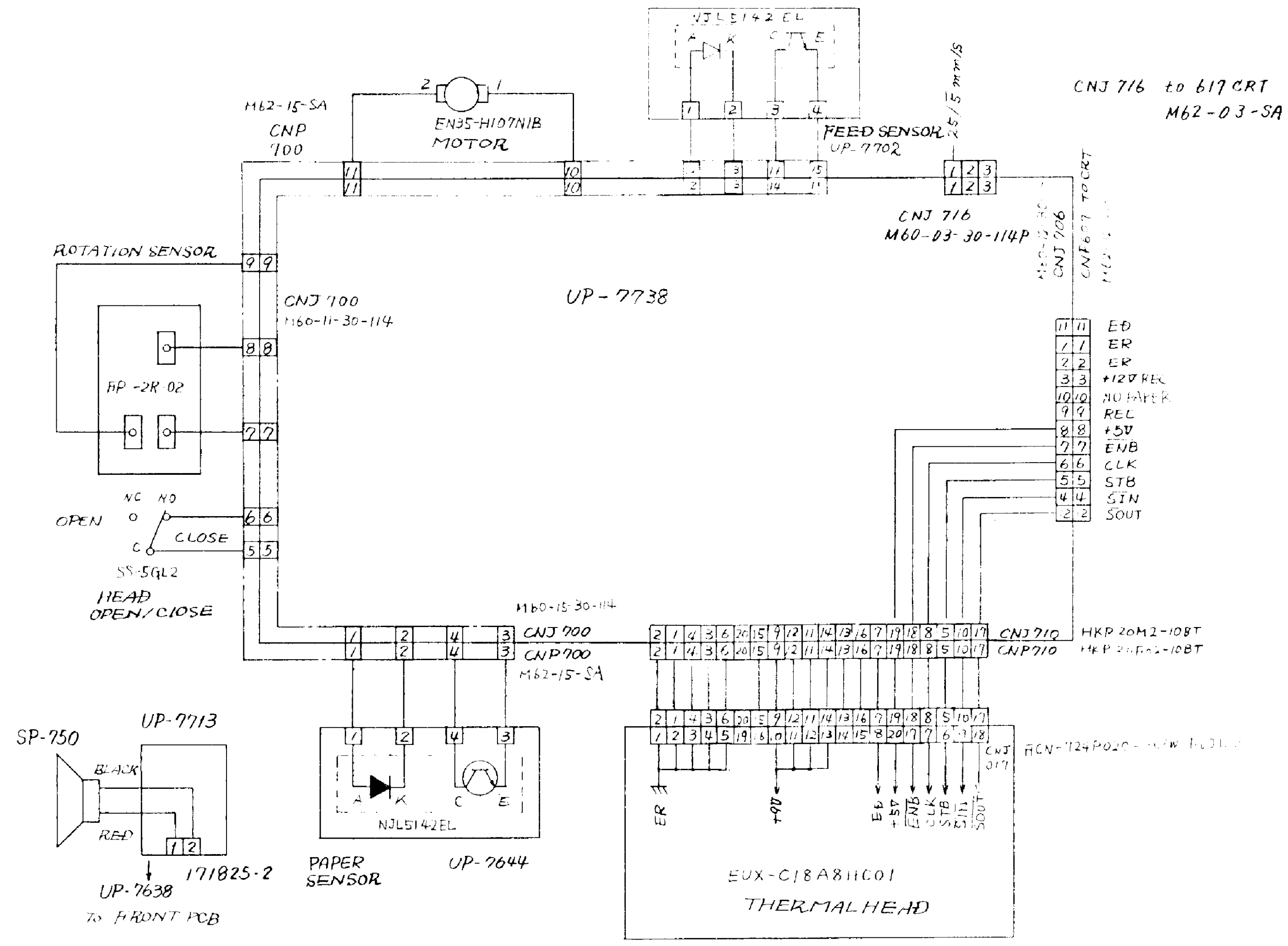
DWG NO 105524
MODEL UP-7737
NAME ECG / CPU BD (3 / 5) ECG1

ECG / CPU BD
UP-7737


CNJ100 TO DIP SW
CNJ 08 TO POWER
NIHON KOHDEN
TOKYO JAPAN
9773-5
89-5
A
B
E
F
G
H
K
L
RA100
TP103
D108
D225
D224
D228
IC109
R122
R123
IC203
IC204
TPAD07
TPAD06
TPAD04
TPAD2
RA202
RA204
TP201
TPEA
IC202
IC120
IC102
PC302
PC30
RA230
R121
T352
T35
T38
VP38
IC307
TP304
TP305
TP306
R308
R307
R305
R306
CNJ157 TO PANEL
CNJ 303
TO ECG
CNJ 355
TO PADDLE
BELL
TP101
R120
3
2
1
0
9
8
7
6
5
4

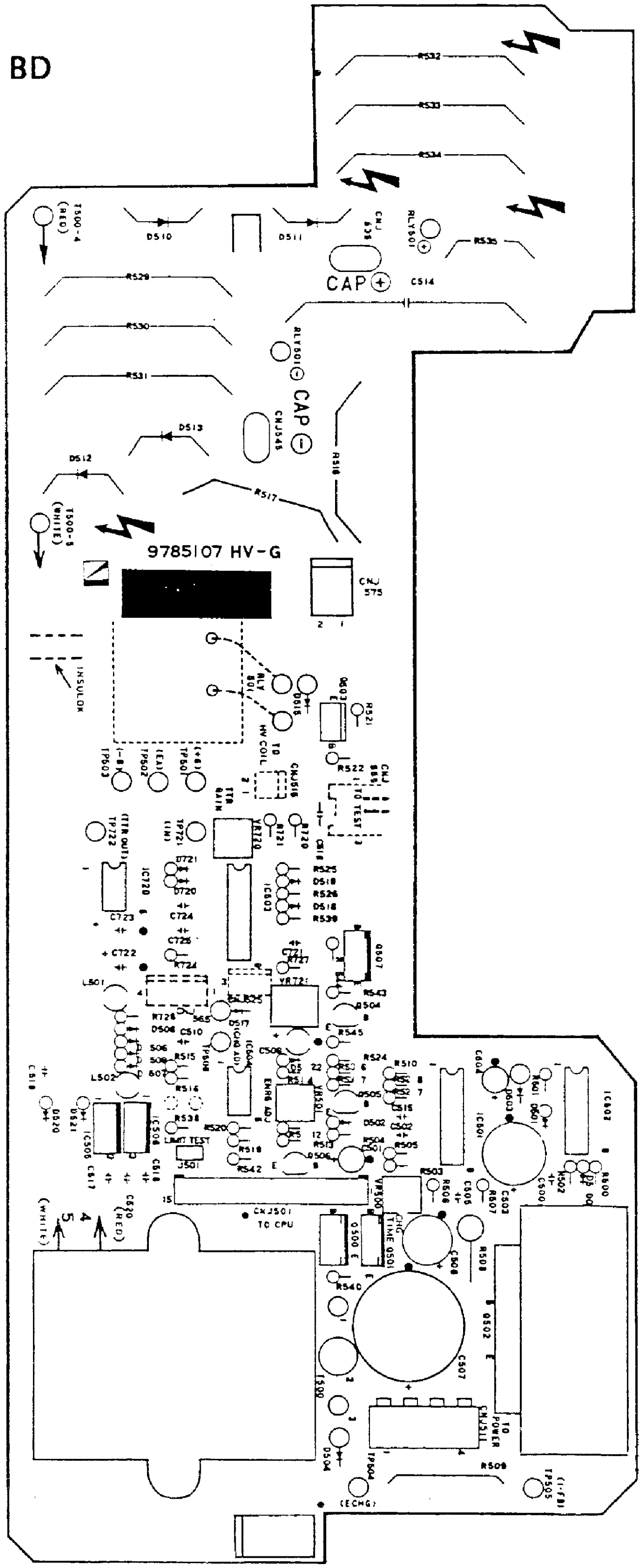

4/5
DWG NO 105527B
MODEL UP-7737
NAME ECG/CPU BD (4/5) CRT
IC413 27C256
IC405 63B03XP
IC404 MB84256
IC401 74HC244
IC402 74HC244
IC403 74HC245
IC406 624C
IC408 14042B
IC409 74HC151H
IC410 74HC4040
IC411 74HC02
IC412 74HC03
IC114-2 177092
IC121 HC00
VSYNC
BLANK
BRIGHT
HSYNC
CH1/CH2
WAVE/CHR
CNJ106
TP403 Y.SIG
TP404 ED
TP405 EA
D401 1S953
Address Bus (IC405, 35~41, 43~50)
Data Bus (IC405 51~58)
LEADSOFF
REF
RST
HALTCRT
WR
RD
CSCRT
79CL
TD-RMHE
×100
+5.0V
EA
ED

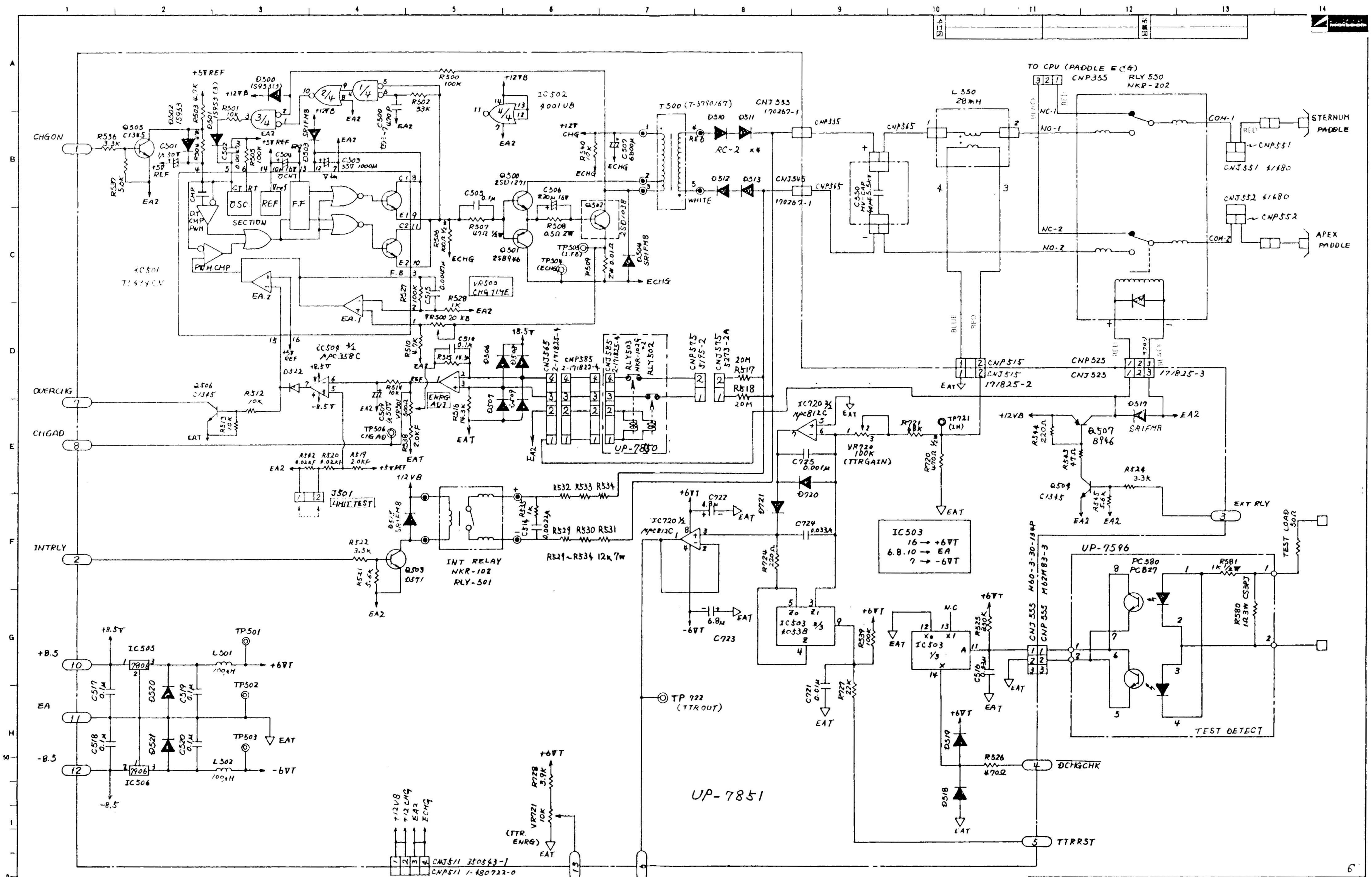

CNJ105 TO HV
CNJ110 TO VR CN
CNJ106 TO CRT
CNJ108 TO POWER
HKP-22MS-11RT
CNJ157 TO FRONT PANEL
CNJ100 TO DIPSW
CNJ355 TO EXT RY
CNJ333 TO ECG CN
CNJ116
M60-15-30-114P
M60-12-30-114P
HIF3F-40PA-2.54DSA
HIF3F-34PA-2.54DSA
DWG NO 105528
MODEL UP-7737
NAME ECG/CPU BD (5/5) CONNECTOR
5/5


M62-15-SA
CNP 700
EN35-H107N1B
MOTOR
NJL5142EL
A
K
C
E
FEED SENSOR
UP-7702
25/5 mm/s
CNJ 716 to 617 CRT
M62-03-SA
CNJ 716
M60-03-30-114P
CNJ 706
CNP 607 to CRT
ROTATION SENSOR
RP-2R 02
CNJ 700
M60-11-30-114
UP-7738
ED
ER
ER
+12V REC
NO PAPER
REL
+5V
ENB
CLK
STB
SIN
SOUT
NC
NO
OPEN
CLOSE
C
SS-5GL2
HEAD
OPEN/CLOSE
M60-15-30-114
CNJ 700
CNP 700
M62-15-SA
CNJ 710
CNP 710
HKP 20M2-10BT
CNJ 017
ER
+VD
ED
+5V
ENB
CLK
STB
SIN
SOUT
EUX-C18A811C01
THERMAL HEAD
SP-750
UP-7713
BLACK
RED
171825-2
UP-7638
To FRONT PCB
PAPER
SENSOR
UP-7644
NJL5142EL

DWG NO	105561
MODEL	WS-702V
NAME	MOTOR CONTROL BD

HIGH VOLTAGE BD
UP-7851


R532
R533
R534
R535
CNJ 536
RLY501 +
CAP +
C514
T500-4 (RED)
D510
D511
R529
R530
R531
RLY501 −
CAP −
CNJ545
D513
D512
R516
R517
T500-5 (WHITE)
9785107 HV-G
CNJ 575
INSULOR
RLY 801
D615
Q603
R521
TO HV COIL
TP503 (-B)
TP502 (EX)
TP501 (+B)
CNJ516
TTR GAIN
R522
CNJ 585 TO TEST
TP722 (TTR OUT)
TP721 (IN)
VR720
R721
R720
IC720
D721
D720
C723
C724
C725
C722
R724
IC603
R525
D518
R526
D518
R530
Q607
C721
R727
VR721
L501
R728
D506
C510
D517
R543
Q504
R545
L502
R515
R516
R538
TP508
IC604
C506
ENRG ADJ
VR502
R520
R518
R542
LIMIT TEST
J501
CNJ501 TO CPU
C820 (RED)
(WHITE)
4
5
C818
D520
D521
IC505
IC506
C517
C518
R524
R510
C515
Q505
D502
R504
R505
R513
Q506
R503
R506
C505
R507
C503
C500
R502
R500
C604
R601
Q601
IC501
IC502
Q500
Q501
CHG TIME
VR500
C508
R508
Q502
R540
C507
T500
D504
TP504 (ECHG)
CNJ511 TO POWER
R509
TP505 (I-FB)



CHGON
OVERCHG
CHGAD
INTRLY
+8.5
EA
-8.5
+5V REF
D500 1S953(3)
+12VB
R500 100K
R502 33K
R501 10K
C500 470P
EA2
IC502 4001UB
+12VB
IC501 TL494CN
OSC
REF
F.F
DT CMP
PWM
SECTION
PWM CMP
EA 2
EA 1
R536 3.3K
Q505 C1345
R537 5.6K
C503 33V 1000μ
Q500 2SD1271
Q501 2SB946
Q502 2SD1038
C505 0.1μ
C506 220μ 16V
R507 47Ω ½W
R508 0.5Ω 2W
TP505 (1.FB)
TP504 (ECHG)
D504 S1FM8
R509 0.01Ω 2W
ECHG
VR500 CHG TIME
R528 1K
VR500 20KB
R527 100K
C515 0.0047μ
R506 100K ½W
+12V CHG
R540 15K
C507 6800μ
T500 (T-3790/67)
D510 D511
RC-2 ×4
D512 D513
RED
WHITE
CNJ333 170267-1
CNJ345 170267-1
CNP335
CNP345
CNP365
L550 28mH
C550 40μ 5.5KV
BLUE
RED
4
3
TO CPU (PADDLE ECG)
CNP355
RLY 550 NKR-202
NC-1
NO-1
NC-2
NO-2
COM-1
COM-2
STERNUM PADDLE
CNP551
CNJ551 1/680
CNJ552 1/680
CNP552
APEX PADDLE
CNP515
CNJ515 171825-2
CNP525
CNJ525 171825-3
EAT
IC504 ½ μPC358C
18.5V
+5V REF
D522
Q506 C1345
R512 10K
R513 10K
R510 4.7K
R514 10K
C501 4.50V
VR501 500Ω
R538 2.0KF
R515 18.3K
R516 14.3K
C510 0.1μ
ENRG ADJ
TP506 CHGAD
D506 D507 D508 D509
CNJ365 2-171825-4
CNP385 2-171822-4
CNJ385 2-171825-4
RLY503 NKR-102
RLY502
UP-7850
CNP575 5175-2
CNJ575 5273-2A
R517 20M
R518 20M
R542 6.02KF
R520 6.02KF
R519 2.0KF
+6V REF
J501 LIMIT TEST
+12VB
D515 S1FM8
R532 R533 R534
R529 R530 R531
R529~R534 12K 7W
R535 1K
C514 0.0022μ
INT RELAY NKR-102 RLY-501
R522 3.3K
R521 5.6K
Q503 D571
IC720 ½ μPC812C
C722 6.8μ
C723 6.8μ
C724 0.033μ
C725 0.001μ
D720
D721
R724 220Ω
IC503 ⅓ 4053B
R721 68K
TP721 (IH)
R720 100K ½W
VR720 100K (TTRGAIN)
IC503
16 → +6VT
6.8.10 → EA
7 → -6VT
+12VB
R544 220Ω
R543 47Ω
Q507 B946
D517 S1FM8
Q508 C1345
R545 5.6K
R524 3.3K
EA2
EXT RLY
TEST LOAD 50Ω
UP-7596
PC580 PC827
R581 1K ½W
R580 12Ω 3W
TEST DETECT
CNJ535 M60-3-30-13P
CNP535 M62M83-3
R539 100K
C721 0.01μ
R727 22K
IC503 ⅓
N.C
R525 330K
C516 3.3μ
+6VT
D519
D518
R526 470Ω
DCHGCHK
TTRRST
IC505 7808
IC506 7908
L501 100μH
L502 100μH
C517 0.1μ
C518 0.1μ
C519 0.1μ
C520 0.1μ
D520
D521
TP501
TP502
TP503
+6VT
-6VT
-8.5
+8.5V
TP722 (TTROUT)
R728 3.9K
VR721 10K
(TTR ENRG)
+6VT
+12VB
+12CHG
EA2
ECHG
CNJ511 350563-1
CNP511 1-480722-0 170121-1
TO POWER
ENRGADJ
TTROUT
UP-7851
6

CNJ501 M60-15-30-114P

△×		- -		承認 APPD	弘	DWG NO	106732
△×		- -		検図2 CHK 2	一	MODEL	UP-7851 UP-7850
△×		- -		検図1 CHK 1	小林		
△×		- -		設計 DESIGN	津村	NAME	HV BD RELAY BD
△×		- -					
△×		- -					
△×		- -					
変更 REVIS	理由 REASON	年月日 DATE	検図 CHK	写図 TRACE	斎藤		

MANUAL CHANGE INFORMATION

[illegible] latest [illegible] the [illegible] of the [illegible] printing and shipping [illegible]

[illegible]

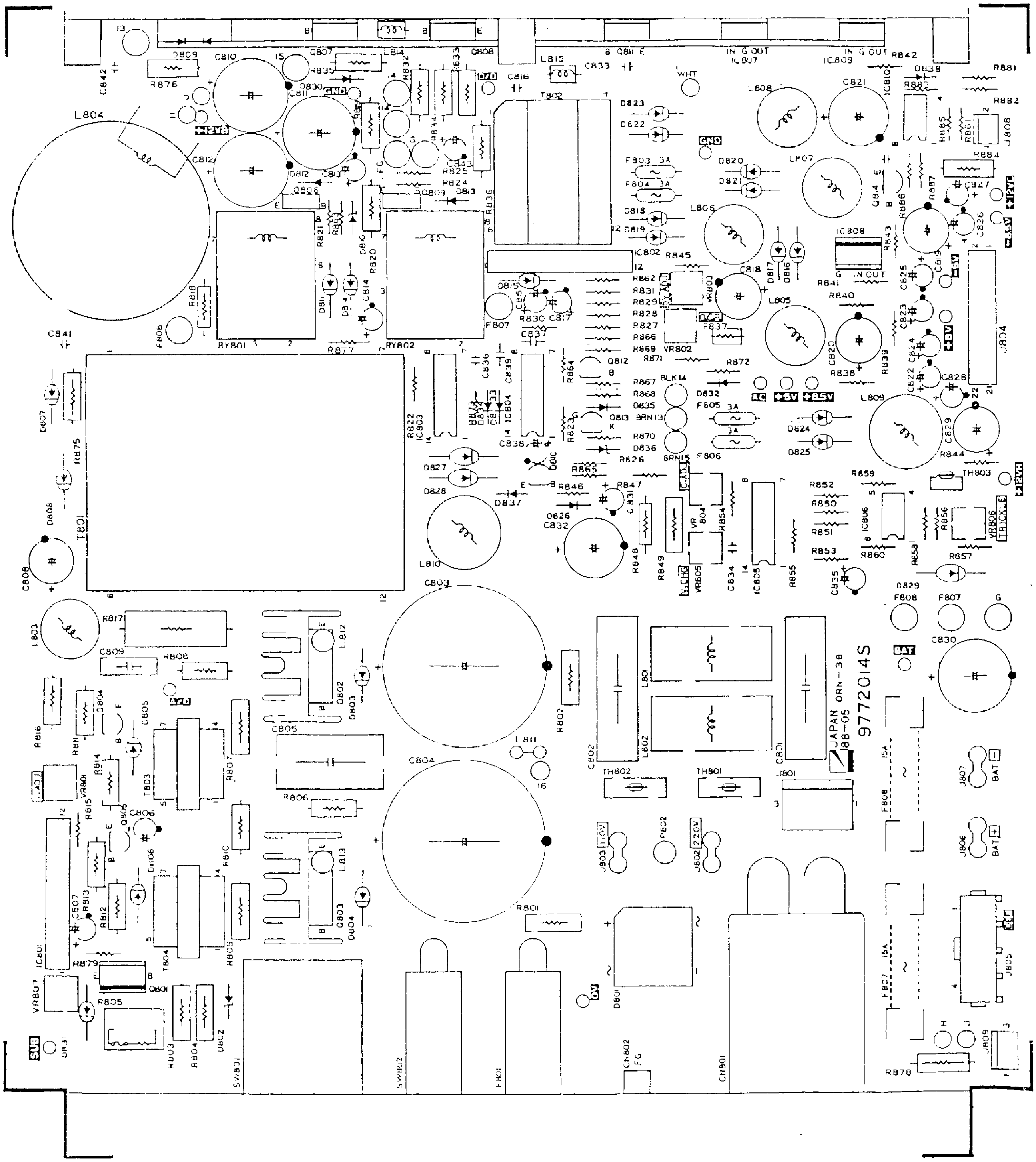
REVISION TABLE (TEC-7100 series)

Model	Master Revision	Serial No.
TEC-7100 A . B . C . E . F . G . H . J [✓ K] R	A5 . A6 . A7 . [✓ A8] . A9 B0 . B1 . B2 . B3 . B4	From 21167
ZR-701VK/702V	[✓ A0] . A6 . A7 . A8 . A9 B0 . B1 . B2 . B3 . B4	From 20001

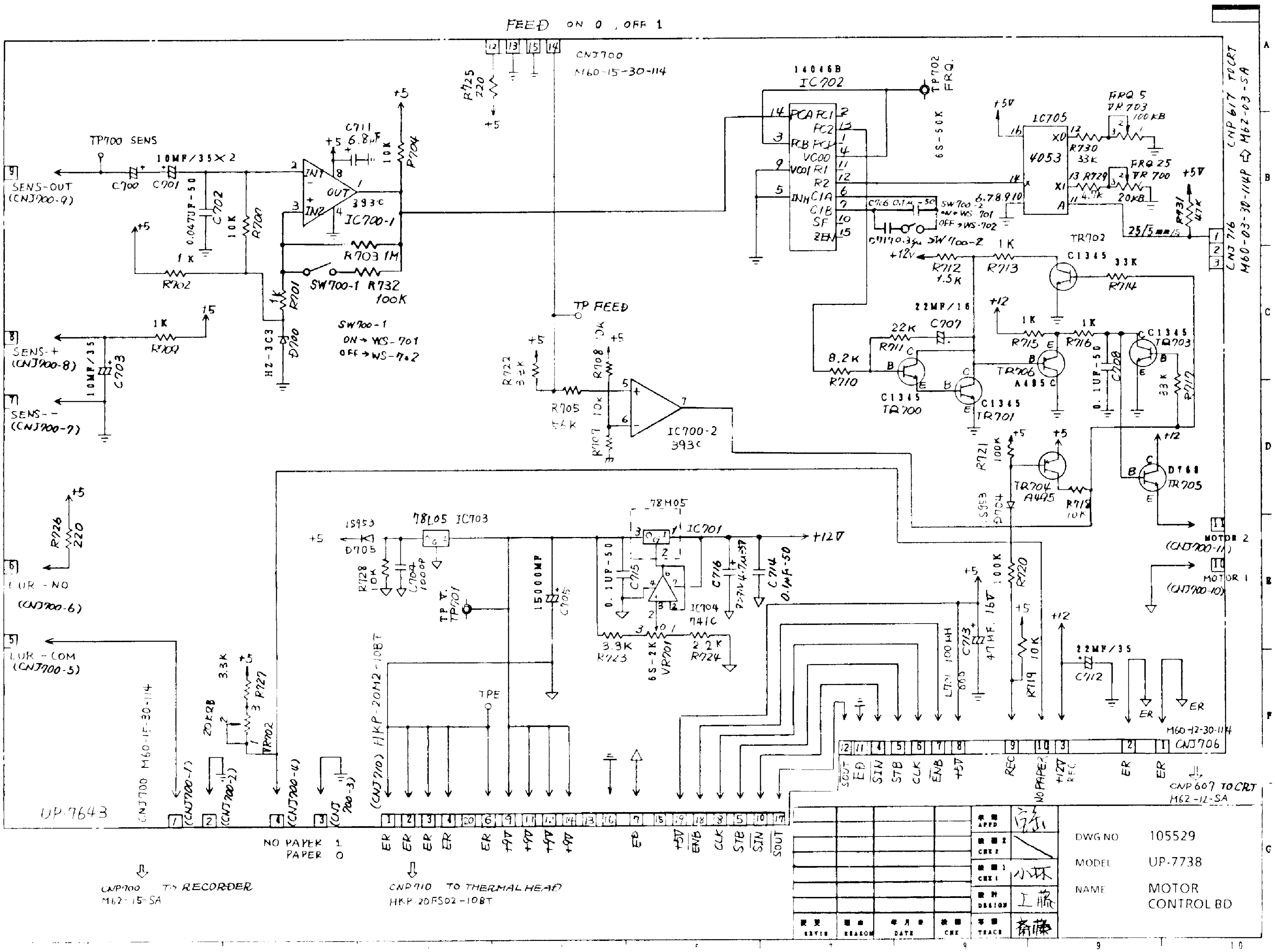
Unit	Description	Component Revision
TEC-7000X	Chassis Parts-1	[✓ A0] . A1 . A2 . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
YZ-001G#	Chassis Parts-2	[✓ A0] . A1 . A2 . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
TEC-710#Z	Accessories	[✓ A0] . A1 . A2 . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
ND-701V#	External Paddle	A0 . [✓ A1] . A2 . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
SC-701V#	Power Unit	A0 . A1 . [✓ A2] . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
WS-701V#	Recorder Unit	A0 . [✓ A1] . A2 . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
UP-7636/7851	High Voltage BD	A0 . A1 . [✓ A2] . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
UP-7740	CRT Driver	A0 . A1 . [✓ A2] . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
UP-7638	Front Panel BD	A0 . [✓ A1] . A2 . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
US-7635#	ECG/CPU BD	A0 . A1 . A2 . A3 . A4 . [✓ A5] . A6 . A7 . A8 . A9 . B0 . B1 . B2
ZR-701VK UP-6762A	RF BD	[✓ A0] . A1 . A2 . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
ZR-702V UP-67692	RF BD	[✓ A0] . A1 . A2 . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2

Model	YZ-001G#	TEC-710#Z	ND-701V#	SC-701V#	WS-701V#	US-7635#
TEC-7100A	YZ-001G8	TEC-7101Z	ND-701V	SC-701VA	WS-701VA	US-76353
TEC-7100B	YZ-001G9	TEC-7102Z	ND-701V	SC-701VB	WS-701VA	US-76355
TEC-7100C	YZ-001G0	TEC-7102Z	ND-701V	SC-701VK	WS-701VC	US-76355
TEC-7100F	YZ-001G1	TEC-7105Z	ND-701VF	SC-701VF	WS-701VF	US-7635A
TEC-7100G	YZ-001G2	TEC-7103Z	ND-701VG	SC-701VG	WS-701VG	US-76357
TEC-7100R	YZ-001G3	TEC-7106Z	ND-701VR	SC-701VR	WS-701VR	US-7635B
TEC-7100J	YZ-001G4	TEC-7104Z	ND-701V	SC-701VJ	WS-701VA	US-76355
TEC-7100K	YZ-001G5	TEC-7102Z	ND-701V	SC-701VK	WS-701VA	US-76355
TEC-7100E	YZ-001G6	TEC-7107Z	ND-701VE	SC-701VE	WS-701VE	US-76359
TEC-7100H	YZ-001G8	TEC-7108Z	ND-701VH	SC-701VH	WS-701VH	US-7635K

SW REGULATOR
UP-7720



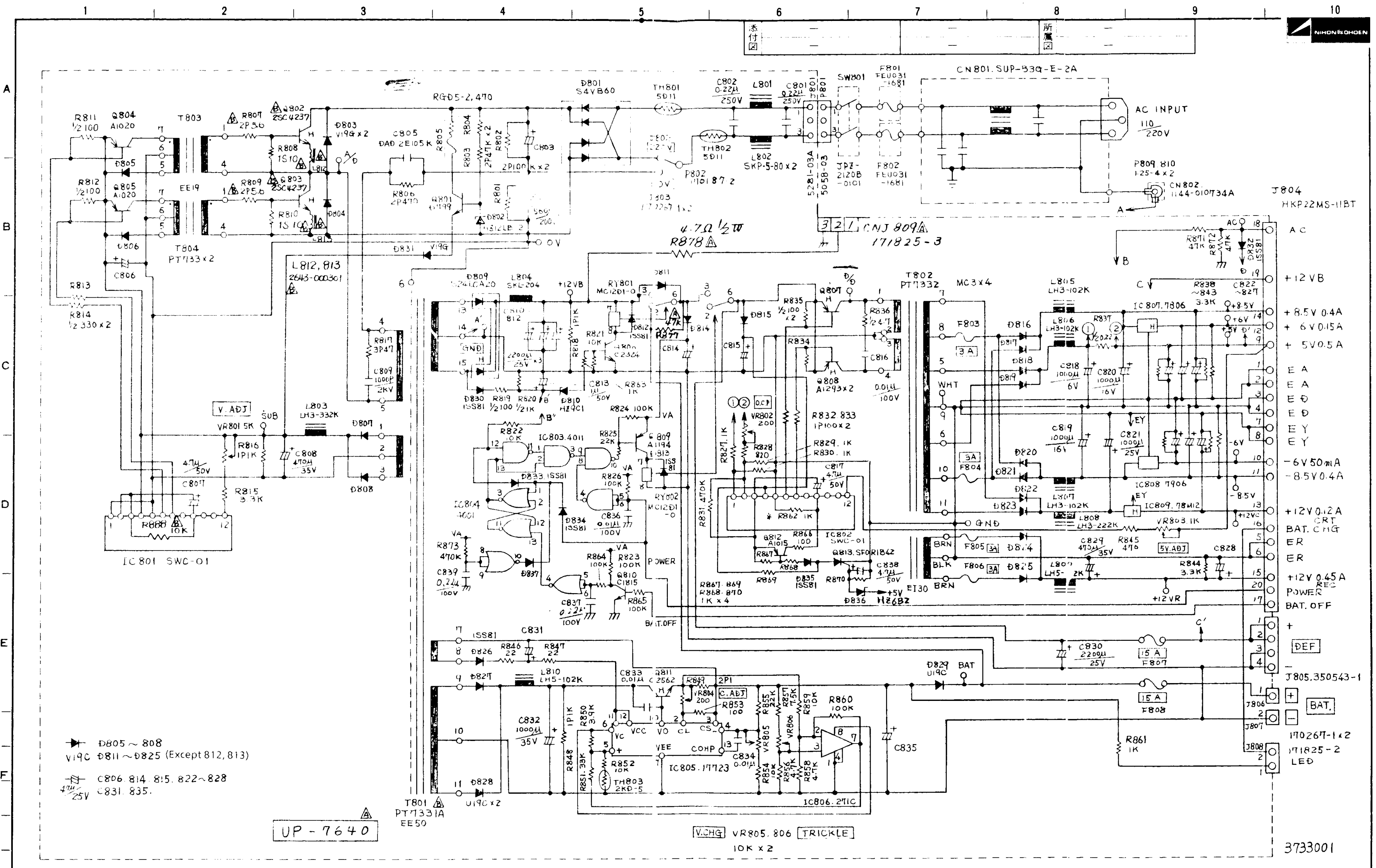
L804
C810
C811
C812
C842
R876
D809
D807
Q807
L814
R835
D830
+12VB
GND
Q808
R832
R833
R834
D/D
C816
T802
L815
C833
Q811
IC807
IN G OUT
IC809
R842
D838
R881
R882
R883
R885
R861
J808
R884
WHT
D823
D822
L808
C821
IC810
F803 3A
F804 3A
D820
D821
LP07
Q814
R887
R886
C827
+12VC
R843
C826
+3.5V
D818
D819
L806
IC808
C819
IC802
R845
D817
D816
C818
R841
R840
C825
+5V
J804
R862
R831
R829
R828
R827
R866
R869
R871
R872
R837
VR803
5V ADJ
OCP
L805
C820
R838
R839
C823
C824
C822
C828
R818
RY801
RY802
D811
D814
C814
R821
R820
D810
R824
R825
R836
D813
D815
C815
R830
C817
F807
F808
C841
R877
C836
C839
C837
Q812
R864
R867
R868
D835
BLK14
D832
F805
BRN13
AC
+5V
+8.5V
D824
D825
L809
C829
R844
TH803
+12VR
R822
IC803
IC804
C838
R823
Q813
R870
D836
R826
BRN15
F806
R865
D827
D828
D837
R846
R847
D826
C831
C832
R848
R849
VR804
R854
C.ADJ
V.CHG
VR805
C834
IC805
R855
R852
R850
R851
R853
R859
IC806
R860
R858
R856
VR806
TRICKLE
R857
C835
D829
F808
F807
G
T801
R875
D808
C808
L810
C803
C804
L803
R817
C809
R808
A/D
R816
R811
Q804
D805
TB03
R807
R814
C805
R806
VR801
V.ADJ
R815
Q805
C806
D106
R810
R813
R812
C807
TB04
R809
IC801
R879
Q801
VR807
R805
R803
R804
D802
SUB
DR31
SW801
SW802
FB01
Q802
Q803
D803
D804
L812
L813
R802
R801
L811
16
C802
L802
L801
C801
TH802
TH801
J801
JAPAN
88-05
ORN-38
9772014S
BAT
C830
F808
15A
J807
BAT −
J806
BAT +
J803
110V
P602
J802
220V
D801
DV
CN801
CN802
FG
F807
15A
J805
J809
R878
H
J
13
15
14


FEED ON 0 , OFF 1
CNJ700
M60-15-30-114
R725 220
+5
14046B
IC702
TP702 FRQ.
6S-50K
IC705
4053
FRQ 5
VR703
100KB
R730 33K
FRQ 25
VR700
20KB
R729 4.7K
R731 47K
+5V
25/5mm/s
CNJ716
M60-03-30-114P
CNP617 TO CRT
M62-03-SA
TP700 SENS
10MF/35×2
C700
C701
C702
0.047UF-50
R700
10K
R702
1K
IC700-1
393C
C711 6.8μF
R704 10K
R703 1M
SW700-1 R732 100K
SW700-1
ON → WS-701
OFF → WS-702
R701 1K
D700
HZ-3C3
SENS-OUT (CNJ700-9)
SENS-+ (CNJ700-8)
SENS-- (CNJ700-7)
10MF/35
C703
R709 1K
TP FEED
R722 33K
R705 56K
R708 10K
R707 10K
IC700-2
393C
C716 0.1μ-50
SW700-2
ON → WS-701
OFF → WS-702
C717 0.33μ
SW700-Z
R712 1.5K
R713 1K
TR702 C1345
R714 33K
22MF/16
C707
R711 22K
R710 8.2K
TR700 C1345
TR701 C1345
R715 1K
R716 1K
TR706 A495
C708 0.1UF-50
TR703 C1345
R717 33K
R721 100K
TR704 A495
R718 10K
D704 1S953
TR705 D768
MOTOR 2 (CNJ700-11)
MOTOR 1 (CNJ700-10)
R726 220
LUR-NO (CNJ700-6)
LUR-COM (CNJ700-5)
1S953 D705
78L05 IC703
R728 10K
C704 1000P
TP V. TP701
15000MF
C705
78M05
IC701
C715 0.1UF-50
IC704 741C
C716 タンタル 4.7μ-35
C714 0.1μF-50
+12V
R723 3.9K
VR701 6S-2K
R724 2.2K
L701 100μH
C713 47MF 16V
R720 100K
R719 10K
22MF/35
C712
ER
M60-12-30-114
CNJ706
CNJ700 M60-15-30-114
20KB
3.3K
R727
VR702
(CNJ700-1)
(CNJ700-2)
(CNJ700-4)
(CNJ700-3)
(CNJ710) HKP-20M2-10BT
TPE
SOUT ED SIN STB CLK ENB +5V REC NO PAPER +12V REC ER ER
CNP607 TO CRT
M62-12-SA
UP-7643
NO PAPER 1
PAPER 0
ER ER ER ER ER +9V +9V +9V +9V ED +5V ENB CLK STB SIN SOUT
CNP700 TO RECORDER
M62-15-SA
CNP710 TO THERMAL HEAD
HKP-20FS02-10BT
A B C D E F G
7 8 9 10

DWG NO	105529
MODEL	UP-7738
NAME	MOTOR CONTROL BD

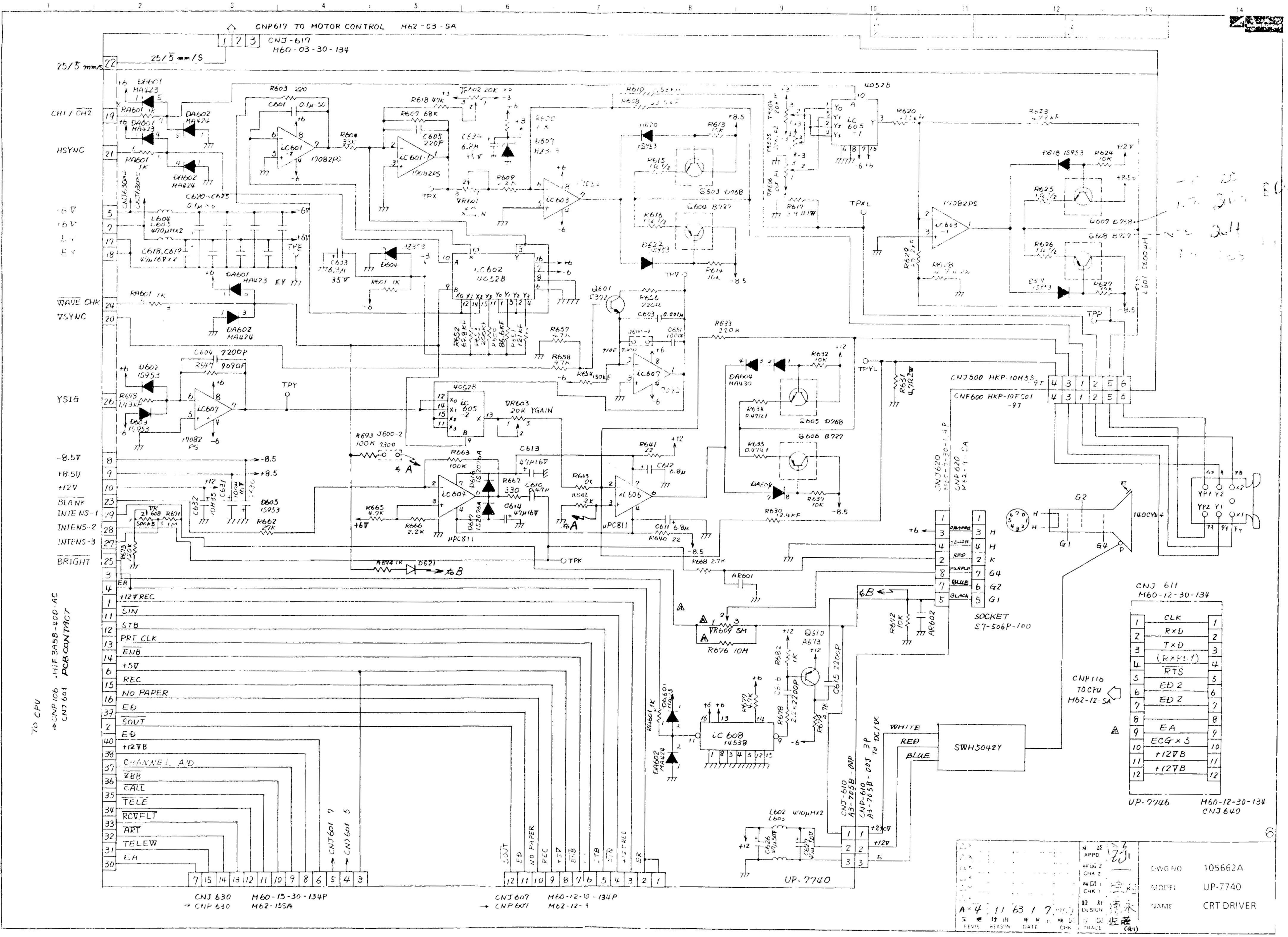
APPD	斉藤
CHK 2	
CHK 1	小林
DESIGN	工藤
TRACE	斉藤

REVIS REASON DATE CHK


NIHON KOHDEN
AC INPUT 110/220V
CN801 SUP-B3Q-E-2A
SW801
F801 FEU031-1681
F802 FEU031-1681
L801
L802 SKP-5-80×2
C801 0.22μ 250V×2
C802 0.22μ 250V
TH801 5D11
TH802 5D11
D801 S4VB60
RGD5-2,470
P802 1101877
P809,810 125-4×2
CN802 1144-010734A
J804 HKP22MS-11BT
CNJ 809 171825-3
4.7Ω 1/2W R878
T803 EE19
T804 PT733×2
R811 1/2 100
R812 1/2 100
R813
R814 1/2 330×2
Q804 A1020
Q805 A1020
Q802 2SC4237
Q803 2SC4237
R807 2P56
R809 2P56
R808 1S10
R810 1S10
D803 V19G×2
C805 DA0 2E105K
R806 2P470
L812,813 2643-000301
IC801 SWC-01
R888 10K
V.ADJ
VR801 5K
R816 1P1K
R815 3.3K
C807 47μ 50V
L803 LH3-332K
C808 470μ 35V
D807
D808
R817 3P47
C809 1000P 2KV
D809 S24CA20
L804 SKE-204
RY801 MC1201-0
R821 10K
Q806 C2384
D810 HZ9C1
R822 10K
IC803 4011
IC804 4001
R873 470K
C839 0.22μ 100V
D833 1SS81
D834 1SS81
Q807 A1194
RY802 MC1201-0
R824 100K
R825 22K
R826 100K
C836 0.01μ 100V
R864 100K
R823 100K
Q810 C1815
R865 100K
C837 0.22μ 100V
POWER
BAT.OFF
VR802 200
OCP
R827 1K
R828 820
R829 1K
R830 1K
R832,833 1P100×2
R835 1/2 100×2
Q807
Q808 A1293×2
C817 47μ 50V
IC802 SWC-01
Q812 A1015
R866 100
R862 1K
Q813 SFOR1B42
C838 4.7μ 50V
D835 1SS81
D836 HZ6B2
R867~869 R868~870 1K×4
T802 PT7332
MC3×4
F803 3A
F804 3A
F805 3A
F806 3A
L805 LH3-102K
L806 LH3-102K
L807 LH3-102K
L808 LH3-222K
L809 LH5-2K
IC807 7806
IC808 7906
IC809 78M12
C818 1000μ 6V
C820 1000μ 16V
C819 1000μ 16V
C821 1000μ 25V
C829 470μ 35V
R845 470
VR803 1K
5V.ADJ
R844 3.3K
R838~843 3.3K
R871 47K
R872 47K
D832 1SS81
A C
+12VB
+8.5V 0.4A
+6V 0.15A
+5V 0.5A
E A
E D
E Y
-6V 50mA
-8.5V 0.4A
+12V 0.12A CRT
BAT. CHG
E R
+12V 0.45A REC
POWER
BAT. OFF
DEF
J805 350543-1
C830 2200μ 25V
F807 15A
F808 15A
BAT.
J806
J807
170267-1×2
J808 171825-2 LED
R861 1K
D829 U19C
T801 PT7331A EE50
L810 LH5-102K
C832 1000μ 35V
D828 U19C×2
Q811 2562
VR804 200
C.ADJ
R853 100
R852 10K
TH803 2KD-5
IC805 17723
C834 0.01μ
IC806 271C
R860 100K
C835
VR805,806 10K×2
V.CHG
TRICKLE
D805~808 V19C
D811~D825 (Except 812,813)
C806 814 815 822~828 47μ 25V C831 835
UP-7640
3733001

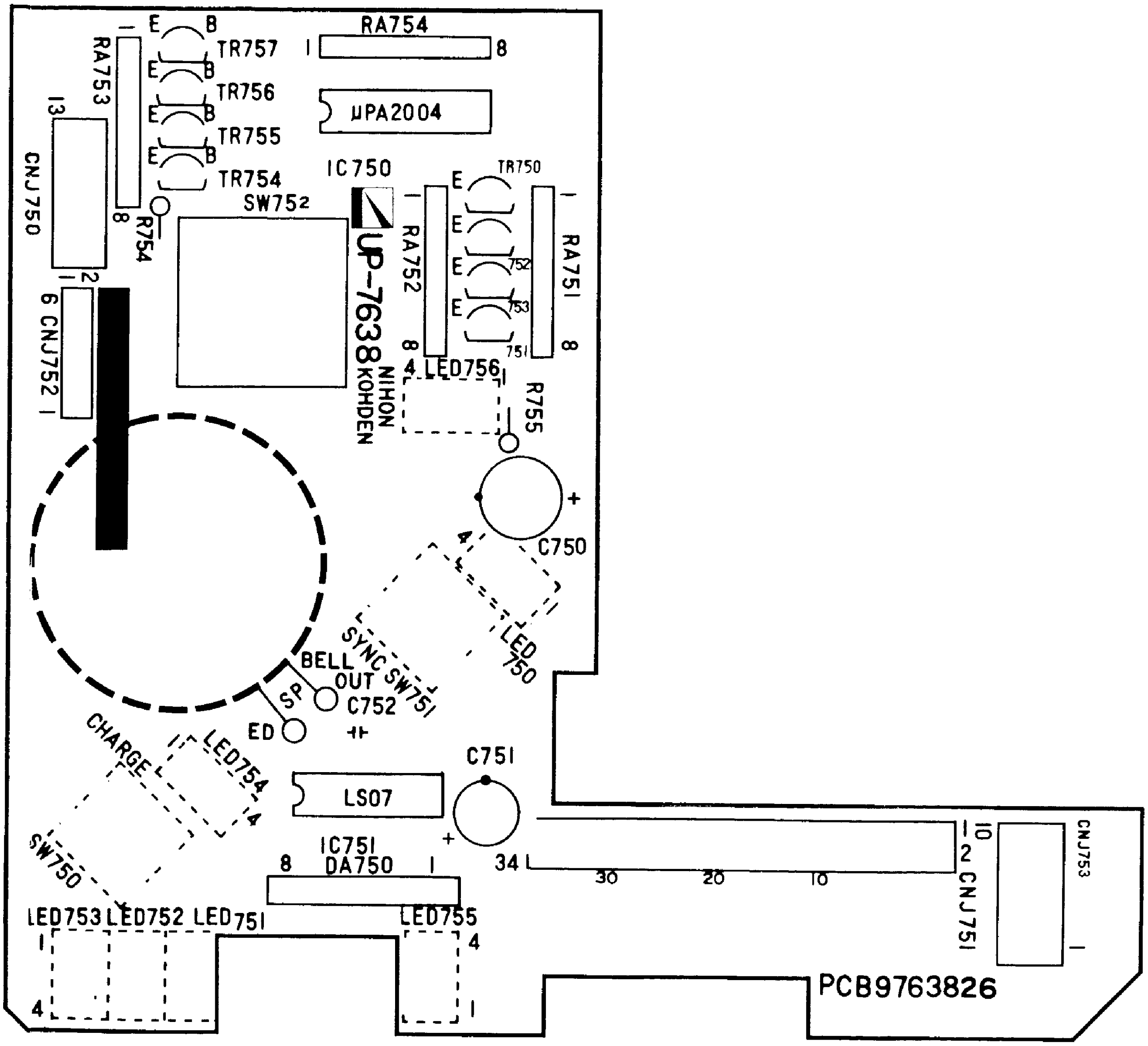
△×		–	–
△×		–	–
△×		–	–
△×		–	–
△×		–	–
⚠×11	33	1-2-16	大保田
⚠×4	11	61-12-16	工藤
変更 REVIS	理由 REASON	年月日 DATE	検図 CHK

承認 APPD		DWG NO	104796B
検図 2 CHK 2	下井	MODEL	UP-7640
検図 1 CHK 1	工藤	NAME	SW REGULATOR
設計 DESIGN	浜中		
写図 TRACE	西川		


CNP617 TO MOTOR CONTROL M62-03-SA
CNJ-617 M60-03-30-134
25/5 mm/S
CH1 / CH2
HSYNC
+6V
-6V
EY
WAVE CHK
VSYNC
YSIG
-8.5V
+8.5V
+12V
BLANK
INTENS-1
INTENS-2
INTENS-3
BRIGHT
TO CPU
CNP106 HIF3A58-40D-AC
CNJ601 PCB CONTACT
+12V REC
SIN
STB
PRT CLK
ENB
+5V
REC
No PAPER
ED
SOUT
ED
+12VB
CHANNEL A/D
ZBB
CALL
TELE
RCVFLT
APT
TELEW
EA
CNJ601 7
CNJ601 5
CNJ 630 M60-15-30-134P
CNP 630 M62-15SA
CNJ607 M60-12-10-134P
CNP607 M62-12-9
IC601 17082PS
IC602 4052B
IC603
IC605 4052B
IC604 μPC811
IC606 μPC811
IC607
IC608 14538
Q601 C392
Q603 D768
Q604 B727
Q605 D768
Q606 B727
Q607 D768
Q608 B727
Q610 A673
VR601
VR603 20K YGAIN
VR609 5M
R676 10M
TPX
TPE
TPY
TPXL
TPP
TPYL
TPK
CNJ500 HKP-10H5S -97
CNP600 HKP-10FS01 -97
CNJ620
CNP620
SOCKET S7-506P-100
140CYB4
G1
G2
G4
YP1
YP2
Y1
Y2
X1
X2
CNJ-610 A3-725B-00P
CNP-610 A3-725B-00J 3P TO DC/DC
WHITE
RED
BLUE
SWH5042Y
CNP110 TO CPU M62-12-SA
CNJ 611 M60-12-30-134
CLK
RxD
TxD
RTS
ED2
ED2
EA
ECGx5
+12VB
+12VB
UP-7746
M60-12-30-134
CNJ640
L602 L603 470μH×2
+12
+23V
+12V
UP-7740

DWG NO	105662A
MODEL	UP-7740
NAME	CRT DRIVER

FRONT PANEL BD
UP-7638


RA754
1
8
RA753
TR757
TR756
TR755
TR754
E
B
μPA2004
IC750
TR750
13
CNJ750
8
R754
SW752
UP-7638
NIHON KOHDEN
RA752
RA751
752
753
751
1
2
6 CNJ752
4 LED756
R755
C750
+
4
LED 750
SYNC SW751
BELL
OUT
C752
SP
ED
CHARGE
LED754
14
SW750
LS07
C751
+
IC751
DA750
8
34
30
20
10
10
2 CNJ751
CNJ753
LED753
LED752
LED751
LED755
4
PCB9763826